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J. N. Eckel M.D.

A

SYSTEM OF MEDICI

BASED UPON THE

LAW OF HOMŒOPATHY.

EDITED BY

H. R. ARNDT, M.D.

IN THREE VOLUMES.

VOL. II.

PHILADELPHIA:
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PREFACE TO VOLUME II.

In presenting to the profession the second volume of this work, the general editor wishes to express to the medical public his sense of obligation for the cordial reception of the first volume, and to its reviewers sincere thanks for the words of commendation as well as for the criticisms offered. The suggestions made by critics have been carefully considered and utilized, so far as practicable, without, however, materially changing the general plan of the work as first conceived.

The reader will observe that in several instances the same subject is discussed by more than one contributor; for instance, a chapter on "Dysentery" not only forms a portion of the section on "Diseases of the Organs of Digestion," in Vol. I., but will also be considered under "Constitutional Diseases," a section which will constitute the larger portion of the third volume. Although involving a certain amount of repetition, the completeness of this work cannot be insured by any other method of treatment of the subject, and the "general index" which will be appended to the last volume of the series will show the reader at a glance where to look in order to find all the information he may desire on any one topic.

Trusting that this volume will prove acceptable and, above all, thoroughly useful to practitioners of the art of healing, it is hereby submitted to the criticism of our colleagues.

H. R. Arndt.

Grand Rapids, Mich., July 10th, 1885.

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A SYSTEM OF MEDICINE.

DISEASES OF THE BLOOD-GLANDULAR SYSTEM.

A. DISEASES OF THE SPLEEN.

BY W. C. GOODNO, M.D.

ANATOMY AND PHYSIOLOGY OF THE SPLEEN.

THE spleen is a ductless gland, varying considerably in its position, weight, and size. It is inclosed by an elastic connective-tissue capsule, and is covered with peritoneum, except at its hilus.

It is situated in the left hypochondriac region, accommodating itself, more or less, to the hollow of the diaphragm upon one side, and to the cardiac end of the stomach upon the other. Below, it is in contact with the upper portion of the left kidney, the suprarenal capsule, and the left crus of the diaphragm.

The position of the spleen depends to some extent upon the movements of the stomach; when this organ is contracted, the longest diameter is quite vertical; when the stomach is distended, the long diameter is horizontal. In inspiration and expiration the spleen is lowered and raised from an inch and a half to two inches.

In weight, the spleen averages eight ounces.

The size varies with the state of the circulation. The average length is five inches, the width is three inches, the thickness one and one-half inches.

The color, on the outside, is a deep, dull red; internally, it is a mottled reddish-brown.

The hilus, which is the depression dividing the inferior surface longitudinally, has ten to fifteen openings for the passage of vessels and nerves.

Underneath the peritoneal covering lies the white fibrous capsule, which is thicker than the peritoneum. It contains many elastic, and some smooth muscular, fibres.

At the hilus the fibrous tissue of the capsule invests the vessels and nerves, and passes into the substance of the spleen with them, forming the so-called capsule of Malpighi.

From the internal surface of the white fibrous capsule there are processes of connective tissue which pass into the substance of the spleen, breaking up into a fine network; uniting with the fibres which come off from the capsule of Malpighi they form the trabecular framework of the organ. In this framework lie the Malpighian corpuscles and spleen pulp.

A Malpighian corpuscle is composed of adenoid tissue, which is developed in a round, oval, or cylindrical mass about one of the terminal branches of the splenic artery. The inclosing membrane of one of these corpuscles is not well defined, but consists of an irregularly fenestrated membrane separating the adenoid tissue from the tissue of the pulp.

The pulp is a spongy tissue, composed of irregular, flat, nucleated cells, with plate-like processes lying over and upon the connective-tissue framework, or trabeculæ. These cells have a rich intracellular reticulum; at the points of intersection are enlargements called nodes. These cells and nodes play an important part in the functions of the spleen.

The spaces inclosed by the plate-covered trabeculæ are of different sizes, and contain both red blood and lymph cells. They form an intercommunicating system of channels through which the blood flows. The capillary bloodvessels at the surface of the Malpighian corpuscle open into, and are continuous with, the spaces in the pulp tissue, and these spaces open, on the other hand, into the venous sinuses, which are in connection with the larger veins. There are some arteries which do not terminate in a Malpighian corpuscle, but open directly into the pulp spaces.

The course of the blood is through the arteries into the capillaries of the Malpighian corpuscles; from them it passes into the spaces of the pulp tissue, to the venous sinuses, and, finally, into the venous trunk.

There is retardation of the flow of blood through the organ, many of the red blood-cells seem to break up, and the residual pigment granules find a lodgment within the cells of the pulp matrix.

The lymphatics of the spleen are most numerous just underneath the external fibrous capsule. They also follow the connective-tissue sheaths that enter the hilus with the vessels.

The nerves of the spleen are derived from the solar plexus, and form a so-called splenic plexus. They are few in number, and consist principally of the fibres of Remak. Embleton believes the spleen receives nerve twigs from each pneumogastric and the sympathetic ganglia on each side.

The difficulty in studying the spleen, owing to the many complex chemical compounds found, and the histological changes that take place, has caused the widest divergence of opinion among physiologists as to its function. Carpenter says: "We are inclined to believe that the office of the colorless parenchyma of the spleen is not only to serve as a storehouse for the surplus albumen that finds its way into the circulation on the completion of the digestive process, but also to excite an assimilating action upon it, whereby it is rendered more fit for the nutrition of the tissues, and of this assimilating action we deem the generation of fibrin to be one of the results; and if it be true, as we have elsewhere suggested, that one special function of the red corpuscles is to assimilate or prepare that peculiar combination of materials which is required for the nutrition of the nervo-muscular apparatus, the disintegration of these corpuscles in the splenic pulp may answer the twofold purpose of regulating their total proportion in the mass of blood, and of diffusing through the liquor sanguinis the materials which the nerves and muscular tissues are to draw from it for their own development."

Studies by A. W. Johnstone, of Kentucky, assisted by Heitzman, of New York, on "The origin of the blood-globules,"* result in conclusions of which the 2d, 3d, 4th, and 5th are of interest to us:

2d. That both red and white blood-corpuscles are developed from the granules of the reticulum of living matter within the fibres of all adenoid tissues.

3d. That in different organs there is a difference in the proportion of red to white globules that are produced.

4th. That the adenoid tissue is myxomatous, and, properly speaking, a remnant of fœtal life.

5th. That this tissue is stored-up material from which the blood-corpuscles are made throughout life.

These conclusions of Johnstone we believe are more nearly correct than most of the ideas held as to the function of adenoid tissue of the blood-forming glands.

We think we have seen in sections of our own cutting quite conclusive evidences of new yellowish nuclear bodies springing from the nodes in the reticulum of the pulp-tissue of the spleen. That these new bodies become blood-cells, we believe. The economy of the system may be such that many of the worn-out cells also die here to give up the residual protein compounds of iron to the new-forming cells, and also that the spleen is a diverticulum or escape-valve, to keep the vascular balance in the viscera, such being incidental functions to the more important one of cell-formation.

The many chemical compounds found in the spleen, differing from others in the body, is only a natural result of the histological changes. The many other hypotheses in reference to the function of the spleen will not be considered.

General Ætiology.—That malarial poison is the ætiological factor in the majority of cases of disease of the spleen is universally acknowledged; it would, however, be a work of supererogation to consider its character, laws of development, etc., in this place. For references to the nature of this poison, and its mode of development, the reader is referred to the chapter upon Malaria. The geographical distribution of splenic disease corresponds quite closely to that of the malarial fevers, and it seems to us that Hirsch, in his Geographical Pathology, rather underrates our information concerning this subject when he indicates that we possess little knowledge concerning it.

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* Arch. of Medicine, August, 1881.

We are safe in affirming that diseases of the spleen prevail especially in the regions where malarial fevers are found occurring as endemics. In our own country we may mention, in general, the Southern States, and, in particular, the lower Mississippi valley, as well as the low lands bordering upon many of our rivers; also portions of certain States, viz., Michigan, Delaware, New Jersey, etc., and further south of us, the Isthmus of Panama and its neighborhood, portions of South America, and the West Indies. In the eastern hemisphere we may mention particularly the coast region of Africa, the East Indies, parts of Italy, Hungary, etc. The time of year appears to exercise little or no effect beyond its influence upon the development of the malarial poison; the same may be said of telluric influences, character of weather, degree of temperature, humidity, etc.

Sex plays a more important part, for men are oftener subjects of splenic disease than women. According to Mosler,* while "diseases of the spleen, in consequence of endemic influences, may be almost equally frequent in the two sexes in many regions, yet at other times the predisposing causes in man are very different from those in women. Disturbances of the sexual functions in the latter have an unmistakable influence upon the occurrence of diseases of the spleen. Ballonius and Portal have frequently observed enlargement of the spleen after suppression of the menses. In diseases of the female sexual organs, if, in addition to a splenic tumor, a slight increase in the white blood-corpuscles is found, continued treatment is necessary to prevent actual leucocythæmia."

A careful study of such cases has, however, led us to doubt the possibility of always clearly distinguishing between cause and effect—the relation existing between affections of the female sexual organs and diseases of the spleen being by no means clear.

Suppression of habitual fluxes, such as hæmorrhoidal discharges, as well as of certain skin-diseases, action of cold externally or by partaking of cold fluids, etc., have been supposed to possess some relation to the development of splenic disease; most of these, however, have little to support their claims as ætiological factors.

Modern pathology has shown embolism to be a cause of special importance of disease of the spleen. It is not an uncommon affection—speaking relatively to other splenic diseases—and occurs oftener in the spleen than in any other organ in the body, this being due, probably, to the large calibre of the splenic artery. The emboli consist of fibrinous particles which are swept especially from the valves of the heart, during the course of rheumatic endocarditis, or organic disease of the heart, or from diseased surfaces of the larger vascular trunks.

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* Ziemssen's Encyclopedia, vol. viii., p. 357.

It will be remembered that the splenic artery and its branches are "end-arteries"—the result of plugging of these vessels is the so-called hæmorrhagic infarction described in another section. Operating in conjunction with the malarial poison—but at times independently—are the marked variations in temperature so frequently found in the warmer climates, amounting often to as much as 30, or more, degrees F. within the twenty-four hours. In our own country such variations are quite common in certain regions, viz., in Florida, Texas, and also in some parts of Northern Mexico, the heat being often oppressive at midday, blankets being necessary at night. In Texas especially these changes may occur within a few minutes. The action of such changes, in inducing splenic congestion, need hardly be enlarged upon.

The influence of the acute infectious fevers, and also of a variety of affections marked by morbid alterations in the blood—such as pyæmia—will be described in other sections.

The retention of excrementitious matters in the blood from failure of the excretory organs, particularly the kidneys, is occasionally the cause of disease of the spleen.

Obstructive conditions, involving the abdominal circulation and disturbing its balance, frequently lead to splenic hyperæmia and its consequences; cirrhosis of the liver is one illustration. The relations of the circulation within the spleen to the portal system should be carefully studied in order to gain a clear conception of the relations of obstructive conditions affecting this system to hyperæmia of the spleen.

Symptomatology.—The conspicuous feature of disease of the spleen is the absence, in a large majority of cases, of distinctive symptoms, general or local, indicating the progress of morbid action within this organ. This statement is worthy of note, as the writings of the past give forth the idea of a more sharply defined symptomatology than the careful observation of such cases in the light of modern research seems to warrant.

Pain.—The reason of the frequent absence of pain is quite obvious from a study of the anatomy of the organ. The loose character of its tissue, admitting of considerable distension without resulting in a high degree of pressure upon its nerve filaments, is alone a conclusive reason; and it is probable that not until the closer-woven capsular tissue is involved, either in the inflammatory process or by distension, do we have painful sensations of an acute character. Most of the *splenic pains* spoken of in the past were in reality due to disease of closely associated organs, viz.: pleurisy, peritonitis, pain in neighboring abdominal viscera, etc. When pain is present, it is referred to the left hypochondrium, is generally diffused over the entire region, and may involve neighboring parts. It is dull in character, and spoken of as a "weight" or a "feeling of tension" or "fulness." The patient lies on the left side to avoid the "dragging" feeling which attends lying upon the opposite side. A certain degree of tenderness may exist.

Acute lancinating pains, and in fact acute pain of any character, is strong evidence of involvement of the capsule or of the adjacent serous membranes.

Sympathetic Pains.—Much was said by the old authors of "sympathetic pains." By this was meant, first, certain pains felt in the region of the spleen during the progress of affections of other organs, as, for instance, pain in the spleen occurring during the progress of disease of the liver, and secondly, (recognized at a much later period) morbid sensations felt at a distance from the affected organ through nervous connections. The pains mentioned in the first class were more talked of formerly than now, for research is demonstrating the presence of local conditions sufficient to account for their presence, and those possessing the largest experience now seldom fail to distinguish such a condition of pain unaccompanied by sufficient local cause. Most instances of "sympathetic pain" have undoubtedly been due to splenic disease consecutive to some primary affection of another organ; that such pains never occur, we are by no means prepared to affirm.

The more remote "sympathetic pains" have a better claim upon our attention. They have been brought more forcibly to prominence during the past decade, especially by Embleton.* The most characteristic form is the so-called "shoulder tip" pain, which is found oftenest in the left shoulder, although it may affect the right, or both simultaneously. This pain is easily explainable, should Embleton's statements be corroborated that the spleen receives filaments from each pneumogastric as well as from the sympathetic ganglia of each side.

Lungs.—The confirmed anæmia found in many forms of disease of the spleen leads inevitably to a lessened ability on the part of the blood to act its part in the function of respiration, and dyspnœa results. Consequently, in patients with chronic splenic disease we find panting after slight exertions, due not only to the diminished respiratory power of the blood, but also to defective action of the weak, irritable heart and the weakened respiratory muscles. Other factors may be: pressure of the enlarged spleen upward upon the diaphragm, various secondary affections of the lungs, effusions into the pleural cavities, and (as in the brain) stasis of the circulation through the loading of the pulmonary capillary vessels with blood, due to the adherence of the sticky, colorless corpuscles.

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* British Medical Journal, September, 1874.

Nervous System.—Patients may become despondent, tearful, irresolute, and perhaps suffer from fits of irritability; their ambition for employment seems to desert them; they complain of headache, vertigo, deafness, tinnitus, etc.

Urine.—Although considerable attention has been bestowed upon the examination of the urine of patients suffering from splenic disease, it cannot be asserted that there are as yet any important abnormalities of this fluid peculiar to disease of the spleen. Varying results are obtained by different analysts.

There is general consent to the statement that in the earlier stages the quantity is not markedly altered, but that toward the close it is diminished.

There is frequently a copious deposit of urates upon cooling; crystals of uric acid and of oxalate of lime are common.

Most attention has perhaps been bestowed upon the urine of leucocythæmic patients. Virchow's assertion that uric acid is more freely secreted in leucocythæmia seems corroborated, and inferences are drawn by several observers (Ranke notably) as to the part, if any, occupied by this organ in the formation of uric acid. The experiments to elucidate this point are as yet too few and incomplete to permit a judicial opinion.

Fever usually attends the acute forms of disease of the spleen, and a moderate rise may accompany some of the chronic varieties. It is due to the splenic changes alone, or perhaps oftener to the disease process during the progress of which the changes in this organ are developed, or to both combined.

The skin presents a sallow, yellowish appearance, and the face is often swollen, the eyes heavy, and the general appearance that of stupidity.

The mucous membranes are also pale, plainly manifested in the lips, mouth and conjunctivæ. These symptoms point to the anæmic state which is so conspicuous in most chronic diseases of this organ.

Hæmorrhage.—A subject not yet sufficiently investigated, in its pathological aspect at least, is the hæmorrhagic condition frequently occurring during the course of chronic splenic changes.

These hæmorrhages occur from any of the mucous membranes, are at times dangerously profuse, and not unfrequently prove fatal.

Epistaxis is by far the most frequent and troublesome form. The bleeding may occur from either or both nostrils, contrary to the old-time opinion limiting it to the left side. Its advent may be sudden, and the quantity sufficient to rapidly blanch the patient or even, as already stated, prove fatal; or a trickling hæmorrhage may, with free intervals of a few hours, continue for days. We would call attention to the fact that the area of the bleeding surface is often very small; in a case falling within the observation of the writer, occurring in a boy of 14 years, examination proved the bleeding to be from a spot situated upon the middle turbinated bone, not larger than a pea, and which was checked by pressure from a pledget of cotton-wool after several days' continuance and after the failure of all the usual means of treatment.

This simple measure is therapeutically of the greatest value, as all will acknowledge who have employed the nasal tampon.

There is in some instances a marked periodicity in the hæmorrhages; it is quite common in cases of splenic disease in which the patient is still able to get about and attend to some duties for them to occur at intervals of a few weeks. In the late stages, however, they may occur daily, or be continuous until death. Women are especially liable to them at the menstrual period.

The influence of this *hæmorrhagic diathesis* upon the course of the primary disease is most pernicious. If the bleedings are frequent, a most unfavorable prognosis is warrantable, few patients living more than a few months after its development.

Anæmia.—A degenerate state of the vascular walls and at times an increase of the white corpuscles of the blood seem to be the principal factors conducing to the above result. The diseased state of the vessels is undoubtedly a most important element; observations have been too few, however, to allow us to state with any degree of positiveness the character of the change.

Blood.—The blood changes undoubtedly very much in the different morbid conditions of the spleen, and we are neither thoroughly acquainted with the chemistry of these changes nor with the relation of the spleen to the morphological elements of the blood which undergo such marked variation in numbers in the differing forms of disease of this organ; a greater degree of certainty in this matter is hoped for, and might lead ultimately to greater therapeutical results.

Increase of the relative number of the white blood-corpuscles is the most characteristic and remarkable alteration found in the blood during one form of disease (Splenic Leucocythæmia) in which the spleen is prominently involved.

The reason of the presence of this increased number of white corpuscles in the blood in splenic leucocythæmia, and not in other forms of disease presenting enlarged spleen with hypertrophied pulp, is not altogether clear. Mosler* says: "In leucæmia we assume that the lymph-cells are generated in abnormally large quantities in their normal birth-place—especially the spleen—immediately pass into the blood, and here, as white blood-corpuscles, produce the leucæmic condition of the blood. The absence of the leucæmic condition of the blood and the persistence of the relative proportion of the colored and uncolored corpuscles in simple tumor of the spleen allow us to suspect that a retention of the lymph-cells formed in the hyperplastic spleen has taken place. The distinction from leucæmia seems to consist only in this, that the lymph-cells generated in excess by the hyperplasia of the lymphatic elements, in cases of leucæmia, migrate from their birth-place; while, on the contrary, in the simple tumor of the spleen—the so-called pseudo-leucæmia—they remain at the place of their formation."

This statement is purely hypothetical. It seems probable however, although reasons are not patent why in the one instance the proliferated cells migrate into the circulatory fluids, and in others are retained within the parent gland.

In addition to the marked increase of the white corpuscles we observe, much oftener, a *decrease of the red corpuscles;* attending this diminution are the usual changes peculiar to anæmia.

Heart, Pulse, etc.—The usual anæmia leads to irritable, and consequently inefficient, heart—resulting in weak cardiac impulse, greater clearness of the valvular eléments of the heart sounds—palpitation, cardiac and vascular murmurs, and a pulse which lacks particularly in volume, but which presents marked varieties according to the character and duration of the disease.

General Pathology.—Organic alterations in the spleen may be acute or chronic, and are generally attendant upon, or the sequence of, some primary affection.

The inflammatory process is not unfrequent, and is generally of the chronic variety. Chronic splenitis is rarely the result of the acute form, but is rather a chronic process from its incipiency, the early stage being one of slowly progressing hyperæmia, which finally, when the inflammatory state is fully established, passes into exudation of inflammatory material. It is a not unusual result of the action of malarial poison, and is also frequently sequential to a variety of abdominal affections which, in common, result in obstruction of the portal circulation.

These chronic inflammatory processes in the spleen are especially marked by their absence of symptoms, and this, in past times, has led to considerable obscurity in diagnosis, and even at present causes them to be frequently overlooked by physicians who do not bring to their aid the modern methods of physical diagnosis.

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* Ziemssen, vol. viii., p. 381.

Acute inflammation of the spleen may result from the action of malarial poison. Probably the sudden distension of the organ which occurs during a malarial paroxysm may excite inflammation, the organ suffering traumatism. Cold, injury, and intemperance are all factors in various cases, though the latter is questionable. More frequent than any mentioned are the hæmorrhagic infarction and pyæmia.

Inflammation occasionally terminates in suppuration, less frequently in induration. The parenchymatous substance as well as the fibrous tissue and capsule are involved.

Enlargement of the spleen results from a variety of causes, and varies in its anatomical characters. It may be acute or chronic; some authors speak of acute and chronic tumor of the spleen.*

Acute enlargement of the spleen is oftenest attendant upon the various forms of malarial fever. It is common in typhoid, relapsing and puerperal fevers, and is frequently met in the eruptive fevers, in pneumonia, erysipelas, pyæmia, acute yellow atrophy of the liver, etc., etc.

The ætiology of acute enlargement presents questions of interest which cannot yet be satisfactorily answered. Some believe this condition to be due to the inflammatory process, others think that it is mainly the result of high temperature, while still others hold that it depends upon the action or retention of bacteria. These statements represent the dominant theories relating to this subject. The dependence of the enlargement upon bacteria is the prevailing theory at present.

Enlargement.—The organ is softer than normal, and may be diffluent. The Malpighian corpuscles are enlarged and, at times, cannot be distinguished from the surrounding tissue. The trabeculæ are friable. Careful examination of such spleens shows the swelling to be due especially to changes in the splenic pulp which consist, first, of a hyperæmic gorging of the vessels, and second, of cellular hyperplasia.

Microscopical Changes.—One is struck by the diversity of size and character of the cell-forms as seen under the microscope, providing proper methods of hardening and mounting are employed. Abnormally large cells are especially noticeable, some of which contain pigment granules. Ponfick states that these cells contain also "red blood-corpuscles, which, according to the stage of the disease, were fresh or in the various stages of retrogressive metamorphosis."

He also, especially in the case of splenic affection associated with relapsing fevers, recognized cells containing fat granules and globules resembling granulation cells. Beyond this, little is known of the minute changes occurring in acute enlargement.

In support of this ætiological hypothesis, it is stated that post-mortem examinations have shown that especially in the infectious fevers the spleen contains quantities of organisms. It has also been shown, particularly by Ponfick, that granular matter, viz., cinnabar, introduced into the circulatory system, is separated from this fluid by the spleen, and the deduction is made from these, to us rather insufficient, grounds that the spleen separates from the blood "organisms" which accumulate and lead to enlargement by their presence.

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* Mosler.

The enlargement is usually uniform, affecting the organ equally in all its parts. The weight is increased in proportion to the enlargement. If the spleen has been previously healthy, its capsule presents the usual lustre and is more or less tense, unless the spleen is already diminishing in size, when the capsule may show a wrinkled appearance. Upon section, the pulp is found dark bluish-red, or blackish, simulating a blood coagulum.

Chronic enlargement of the spleen is the result of a variety of pathological conditions. It is frequently sequent upon malarial affections, or it may be due to lardaceous degeneration, syphilis, carcinoma, tubercle, hydatid, Hodgkin's disease, leucocythæmia, etc.

Diseases involving an obstruction of the portal circulation, such as interstitial hepatitis, lead to the same result, as do also the cardiac lesions causing obstruction in the systemic circulation.

Most of these forms will be considered under their respective headings.

Extravasation of blood sometimes leads to high degrees of hyperæmia. Although vascular degeneration may exercise a causative relation to extravasation independently of, or in association with, hyperæmia, yet upon this point we know little. The extent of the hæmorrhage varies much, instances of rupture of the capsule of the organ and fatal bleeding into the peritoneal cavity being reported. Such ruptures have occurred during malarial and typhoid fevers, also during convulsive paroxysms and labor.

The spleen may be the seat of miliary tubercles, but only in connection with the general process. Cheesy masses, however, may be found, disassociated from general tuberculous affection; it is questionable whether such masses are frequently more than degenerated inflammatory products.

Embolic Infarction.—The so-called hæmorrhagic, or embolic, infarction occurs more frequently in the spleen, with the exception of the kidneys, than in any other organ of the body. Whether this condition be in reality always due to migrated emboli, or to changes which are local in character, has not yet been satisfactorily demonstrated. The larger proportion of embolic masses undoubtedly originate in the left heart during the progress of endocarditis, or are separated particles of fibrinous material from diseased valves or the larger vessels. Others may originate in diseased lungs, being transported through the pulmonary circuit before reaching the systemic system. Hæmorrhagic infarction also occurs in many diseases attended by marked blood changes, viz., typhus, septicæmia, and the exanthematous fevers.

These infarctions vary greatly in size: they may be found as small as a pea or filbert, or involving a considerable portion of the organ. They are " wedge-shaped " bodies with their apices directed toward the hilus, firmer on pressure than the surrounding tissue, and of various colors according to their age, those young being blackish-red, or of a brownish tint, the oldest of a yellowish-white color; later, a simple cicatrix may be all that is left to mark the site of the former infarct.

It has been stated that the splenic artery and all of its branches are terminal or " end-arteries," and it can readily be seen that obstruction of a single trunk is sufficient to develop an infarct. (If section of an infarcted spleen be made there will generally be found several of these bodies, which will be seen to project slightly above the cut surface.) The infarct, or piece of tissue in which circulation has been arrested, quickly loses its structural characteristics, becoming necrosed. We may, very early, distinguish the splenic elements; if so, we find the veins, venous sinuses and pulp spaces gorged with blood. Degenerative changes soon supervene, the elements undergo fatty metamorphosis, the blood coloring matter is dissolved, and a portion of it deposited in the form of granules throughout the infarct. Very soon after the plugging of the vessel and the consequent stoppage of the circulation, a collateral hyperæmia takes place about the periphery of the obstructed area, ending in rupture, thus giving a dark-red zone of hæmorrhage surrounding the infarct. External to this hæmorrhagic zone inflammation occurs, resulting in the formation of connective tissue which, synchronously with the degeneration and absorption of the infarct, contracts, ultimately leaving a simple scar or a connective-tissue capsule inclosing a small amount of cheesy matter. With these retrogressive changes the hyperæmia of the spleen subsides, and the organ resumes its normal size.

Diagnosis of Diseases of the Spleen.—We will, in this place, consider especially the physical diagnosis of splenic diseases. It is upon this method that we mainly rely, in fact a conclusive opinion can hardly be reached, in a given case of supposed disease of the spleen, without the aid of this method; hence the uncertainty which involved the subject in the days prior to the perfection of this system, and does even to-day in the experience of those who have not become familiar with its practical application.

The determination of enlargement of the spleen constitutes the substance of physical examination as related to this organ. This is ascertained mainly by means of percussion; palpation and inspection, however, afford valuable information after the enlargement has attained considerable proportions. It is important to bear in mind certain facts relating to the normal spleen when examining for morbid alterations of the organ:

1st. The spleen varies much in size, not only in different individuals, but in the same person at different times.

2d. It possesses a considerable degree of movability, its position being altered by many circumstances relating to the adjacent organs as well as by the simple position of the body; *i. e.*, it is depressed by the inspiratory effort, and elevated by expiration; also, from change in the position of the diaphragm from whatever cause, as, for instance, pleurisy with effusion, empyæmia, pneumothorax, changes in the bulk of the lung, as in emphysema, or certain abdominal affections, as flatulent distension of the stomach and colon, abdominal tumors and a variety of affections of the abdominal viscera.

3d. The boundaries of the organ, as expert diagnosticians have been able to determine them by means of percussion.

The upper or spleno-pulmonary boundary is easily determined, being bordered by the resonant lung tissue. It has been variously located by different observers, some indicating it as high as the seventh rib, but most coinciding with Schuster and Seitz in placing it at from the eighth to the ninth ribs in the axillary line. Its lower border is at about the eleventh rib, thus giving a vertical diameter varying from 5 to 7 centimetres.

The anterior border, according to Weil, reaches to, or slightly beyond, the costo-articular line. According to Leichtenstern and Flint it seldom passes the mid-axillary line.

The posterior border cannot be determined with accuracy, owing to the close relation of the spleen with the kidney.

The patient, during examination by percussion, should lie partially upon the back and right side, the examiner sitting or standing in front, or, which is more convenient under some circumstances, the patient may stand with the front and left side of the body about equally exposed to the sitting examiner, and with the left hand placed on top of the head.

Enlargement of the spleen proceeds, with few exceptions, downward and forward. Until the organ reaches the margin of the ribs, percussion only is available in determining its size; but as it projects forward into the abdominal cavity it can readily be felt, palpation being even more valuable than percussion, because the thin edge of the spleen transmits the tympanitic resonance of the stomach and colon; care should therefore be exercised to employ a light percussion stroke in defining these borders.

Since the relation of the spleen to the adjacent structures has been shown to vary considerably (Leichtenstern), it is advisable to determine the amount of enlargement of the organ upon the total area of dulness presented, and not upon the relation to certain lines, as the costo-articular or mid-axillary.

Accurate percussion of this organ, it must be confessed, is not yet bereft of all difficulty. Much has been written upon the subject, but sufficient is here given for practical purposes.

From what has been already said, it will be seen that it is impossible to accurately diagnosticate slight enlargement of the spleen. The organ is subject to so much variation in size, within the bounds of normality, that this feature alone would confuse; but further we may be unable to determine the existence of a spleen at all by means of percussion; this has happened to our best observers. Schuster states, in his monograph upon percussion of the spleen, that it was the case five times in eighty observations conducted by himself. In these cases no apparent causes of obscurity existed, and it is surmised that in such instances there is an abnormal shape of the organ, it presenting only a small area toward the surface which is accessible to the percussing finger.

Considerable enlargement of the organ may be masked by flatulent distension of the stomach and colon, or by their distension with solid contents. In doubtful cases these causes should be eliminated before percussion is finally employed. Many other conditions which will suggest themselves to the mind of the reader, such as abdominal tumors, enlargement of the liver, affections of the left kidney and various affections of the left pleural cavity, etc., may seriously embarrass the diagnostician.

Therapeutics.—We cannot but confess that the therapeutics of the spleen are in an unsatisfactory condition. Any one who will take the pains to scan our standard works upon therapeutics will discover what a paucity of corroborated indications we possess for the application of remedies to diseases of this organ. A number of reasons may be assigned for this condition: first, diseases of the spleen are comparatively rare; secondly, their symptomatology is limited; and, again, they are usually associated with other disease-forms which obscure them.

Growing out of these facts has been a neglect to employ the research necessary to put our knowledge of the therapeutics of the spleen on a par with our knowledge of the therapeutics of other organs, viz.: the liver, lungs, etc.

Prophylaxis.—The prophylactic treatment of splenic disease is seldom practiced, except in such cases in which the patient is already suspected of being the subject of commencing disease of the spleen; and it then consists in guarding the patient from the action of causes which are known to produce, or aggravate, disease-processes in this organ. The essentials can be summed up in a few words. They consist in the avoidance of malaria, and of diseases leading to embolism, or of syphilis, as well as in the employment of all means calculated to prevent or correct disturbance of the abdominal circulation. We might add also the care of disease of the female sexual organs which possess a decided influence in the development of diseases of the spleen.

For the methods of prevention and cure of those diseases, during the course of, or as a sequence of which, these conditions are developed, the reader is referred to the several articles on malaria, embolism, etc.

Quite a large number of drugs have been recommended by different observers for the various forms of splenic disease, we embracing them all in one section not only as a matter of convenience, but for the more important reason that we are not able, as yet, to classify with any degree of accuracy our remedies as more suitable to this or that pathological condition. This is not to be looked upon as an unmixed evil however, for we know how frequently it matters not whether the pathological condition be one of hyperæmia, inflammation, abscess, etc., providing the remedy be indicated by a sufficient array of reliable symptoms.

In the selection of a remedy for splenic disease, all the symptoms and conditions of the case must be taken into consideration. The fact that disease of the spleen occurs during the progress of many affections, and that even when existing alone the symptoms are very limited, indicates how much we must rely in the selection of the remedy upon symptoms developed by the primary affection. Only such remedies are included in the following as have proven useful clinically and possess some reputation as "spleen-drugs." It is not to be understood, however, that these are the only remedies during the use of which diseases of the spleen disappear; almost any drug in the materia medica may prove a valuable spleen remedy. Sulphur, for instance, while omitted from the following list, is frequently indispensable; but the symptoms indicating it are not such as are directly referable to the spleen.

Aconite.—In inflammations of this organ the chief remedy is aconite, which often arrests the disease in a short time, even if the patient vomits blood, or which at least modifies the disease so that Arnica will remove the rest. [Jahr.]

When inflammatory fever attends. [Lilienthal.]

Agaricus.—Valuable in congestions and enlargements of the spleen. [Clifton.]

Arnica mont.—Has proven a useful remedy; there is much testimony in its favor; splenic affections following injuries; splenitis with typhoid tendency; the patient is apathetic, does not consider himself very sick; vomiting of blood; pains in the spleen which may be either dull or acute. Hyperæmia or inflammation of the spleen during the infectious fevers.

Arsenicum.—Splenitis, acute or chronic; enlargement; induration of the spleen; especially in affections of the spleen occurring during the malarial fevers; when the symptoms present marked periodicity; tensive, aching, stitching pains in left hypochondrium. Diarrhœa, stools watery, bloody, undigested.

Asa fœtida.—Heat in the spleen and intestines; very offensive stools. [Lilienthal.]

Bellis perennis (English daisy).—The rival of Arnica, has caused the following symptom: "Region of spleen so swollen that the false ribs seem forced out."

Bryonia alb.—Severe pain in the region of the spleen, increased by movement and especially by walking, but subsides when at rest. [Bayes.]

Hughes recommends Bryonia where the capsule is affected (as shown by the stitching pain).

Capsicum.—"In chronic splenitis . . . . Capsicum generally proves one of the most efficient remedies, both if the spleen is simply very sensitive and likewise if it is swollen and indurated, particularly after fever and ague." [Jahr.]

Spleen enlarged, sensitive to pressure. Especially suitable to cases which have been *overtreated* with Peruvian bark or its alkaloids.

Cinchona and its derivatives.—Hyperæmia of the spleen. Splenitis, acute and chronic. Hypertrophy of the spleen. Anæmia; pale, ashy countenance; oppressed breathing, palpitation of the heart; vomiting and diarrhœa; pains in the left hypochondrium, dull, aching, or acute, pleuritic in character. Lilienthal gives "aching stitching pains in the spleen when walking slowly; pains extend in the direction of the long axis of the spleen; oppression of the chest; dropsy."

Carbo vegetabilis.—Pressing pinching in the region of spleen; quick, lightning-like stitches; abdomen bloated; scurvy; so weak can hardly walk. [Lilienthal.]

Rademacher, according to Mosler, "assures us that he has proved vegetable charcoal to be curative in some undoubted cases of splenic diseases." "In a man who suffered from a very tedious enlargement of the spleen, with secondary troublesome shortness of breath and cough, other means failing, he tried the vegetable charcoal with brilliant effect, so that the patient was soon entirely freed from his disease. In other cases, however, the splenic asthma did not yield to the charcoal."

Carduus marianus.—Passive hæmorrhages, connected with diseased liver and spleen. [Raue.]

Ceanothus americanus (Jersey tea).—Enlargement of the spleen; deep stitches, with or without soreness.

This remedy is highly spoken of by many who have employed it in splenic hyperæmia and inflammation, both acute and chronic. Some are so extravagant in its praise as to state that they use no other remedy. Dr. Hale considers the spleen as the especial seat of action of this drug. Dr. Burnett, upon the strength of Hale's publication, has used it with success; he recommends it to be given whenever there is complaint of deep-seated pain in the side, even when no tenderness or enlargement of the spleen can be made out, and he has found coexisting affections, such as leucorrhœa, to disappear under its use with the pain itself.

Ferrum met.—Enlarged spleen; especially as a sequence of malarial affections; cramp pains, or shootings in the region of the spleen; vomiting, undigested diarrhœa; stools after eating or drinking; dyspnœa, palpitation, œdema of the extremities. In anæmic, exhausted persons who have abused Quinia.

Iodine.—"Swelling, pain down to iliac region."

Natrum mur.—Enlargement of the spleen, in connection with malarial fevers.

Nux moschata.—"Enlarged spleen, loose bowels; stitches in spleen, must bend double; abdomen enormously distended; dropsy." [Lilienthal.]

Sulphuric acid.—"Spleen hurts when he coughs."

Ranunculus bulbos.—Sensation of soreness in the hypochondrium, especially to the touch; pulsation in left hypochondrium; abdomen feels sore and bruised. This remedy was thought highly of by C. Von Bönninghausen and C. Dunham, as a spleen remedy of value.

SPLENALGIA.

Under the title "Splenalgia" Wardell* describes the acute attacks of splenic pain induced particularly by violent exercise. Most are familiar with the sudden paroxysms of pain occurring in the left hypochondrium after rapid walking, or running, or mounting of stairs. These pains are aggravated by motion, somewhat relieved by pressure, and resemble the pain of pleuritis.

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* Reynolds's System, vol. iii., p. 460.

Nature and Ætiology.—Such pain is not due to inflammation; this is shown not only by the absence of elevation of temperature and acceleration of pulse, but by the sudden accession and subsidence of the pain, leaving the patient in his usual health.

Congestion is evidently the active factor in most cases; this is suggested by the frequent occurrence of this pain during the chill of intermittent fever, and its disappearance with the equalization of the circulation.

It is probable that splenalgia is in some instances purely *neuralgic*, this being the case especially in anæmic individuals who suffer with neuralgic pains in other parts; such are neurasthenic women and those suffering from affections of the uterus or ovaries.

Symptoms.—The symptomatology of splenalgia is meagre. The pain, already described, stands quite alone.

When attacked, the individual halts, places his hand upon the hypochondrium, and inclines the trunk to the left in order to limit the movements of that side. Perhaps the most marked feature of this pain is its aggravation from the respiratory efforts, although there is an irresistible desire to take deep inspirations. This leads to the sudden termination of the inspiration in what the laity call a "catch." This disposition to take deep inspirations is so strong that they are carried to a point of aggravation of the pain which causes the individual to terminate the inspiratory effort suddenly. The violence of the attack is usually over in a few minutes, although in some rare instances it may endure for hours. A sore sensation may be felt in the splenic region for some time after the paroxysm. The pain may be rendered severe by previous adhesions of the organ to the diaphragm or by thickening of the capsule from antecedent inflammation.

Diagnosis.—The diagnosis is easy. The location of the pain, its exciting cause, its transient character, the absence of fever, cough, etc. are sufficiently indicative.

Treatment.—As ordinarily met, splenalgia is an affection of little importance, and scarcely demands treatment, consisting, as it does, of a few paroxysms at long intervals and in healthy young people—such persons, in fact, rarely applying for treatment. Sometimes, however, the attacks are sufficiently frequent and painful to induce the patient to apply for aid. If the attacks are found to follow exertion, violent exercise should be interdicted, or any degree of exertion which has been found sufficient to induce the paroxysms. If it be found coexistent with other conditions which may be presumed to act in a causative relation, these conditions should necessarily engage the larger share of our attention; such states are particularly anæmia, the neuralgic diathesis, various abdominal affections, uterine disease, etc., for the treatment of which the reader is referred to the respective articles treating of these affections.

Congestive Symptoms.—Belladonna, Aconite, Bryonia, Cinchona.

Neuralgic Symptoms.—Gelsemium (?), Zincum valerianicum (?).

ACUTE SPLENITIS.

By this term we indicate an acute inflammation of the spleen. Inflammation of the fibrous capsule or of the peritoneal investment is sometimes called peri-splenitis. Acute splenitis is described as primary and secondary, terms which sufficiently explain themselves; secondary splenitis is sometimes spoken of as the metastatic form.

Ætiology.—Acute inflammation of the spleen is a rare affection and is met most frequently in tropical regions. In this country it occurs most frequently in the metastatic form and in highly malarious districts. Its *geographical distribution* is very closely that of the malarial poison, which is so prominent as an ætiological factor. It is, therefore, most frequently met in the East Indies, in the marshes of Bengal, in portions of Africa, Hungary, Italy, etc., etc.

It is rarely *traumatic*, owing, probably, to the protected position of the spleen. *Cold* seems to be capable of developing it, particularly the cold nights succeeding hot days which are peculiar to certain warm regions. Soldiers who have endured protracted, fatiguing marches under the hot sun, and have lain without sufficient protection at night, are reported by Indian observers as being especially prone to splenic inflammation. Acute splenitis may supervene upon a chronic inflammation of the organ, or the inflammatory process may extend from surrounding tissues, or, possibly, it may result, as thought by some, from the suppression of habitual discharges.

Rivalling any of these influences in importance, however, is the so-called hæmorrhagic infarction which has been described especially by Virchow, Cohnheim, and Billroth. "Consecutive inflammation and suppuration of the spleen are more frequently induced by hæmorrhagic infarctions, particularly by those occurring during infectious diseases" [Niemeyer].

These infarctions occur during the progress of certain heart diseases, especially endocarditis; also during the course of diseases attended by profound alteration of the blood, such as pyæmia and the infectious fevers. The septic properties of the emboli in pyæmia, as well as in certain of the contagious fevers, have special power of developing inflammatory action in the spleen. Whether these infarctions are due in all instances to transported emboli or occasionally to the development of local thrombi is still a doubtful matter.

Anatomical Changes.—The transition from hyperæmia to inflammation is so gradual in the spleen that a sharp line cannot be drawn between them; but with the enlargement of the meshes of the pulp, the increase of its cellular contents and the presence of inflammatory exudation upon the capsule or, it may be, simply a turbidity of that membrane, we are able to arrive at a post-mortem diagnosis.

The spleen is *enlarged* from a slight degree to many times its normal bulk, its capsule being correspondingly tense. If incised, the cut surface presents a grayish color, or a slight pinkish tint is added to the gray. The Malpighian bodies may be prominent as small, white nodules. At other times they are scarcely to be recognized. If the incised surface is scraped, it yields a fluid resembling bloody pus. With the progress of the inflammation the *color* becomes gradually lighter than during the congestive or incipient inflammatory period.

The *consistence* varies considerably, there being a greater degree of firmness in cases attended by marked enlargement of the Malpighian bodies. Generally the organ is very soft, almost diffluent, and care should be exercised not to mistake post-mortem change for such an ante-mortem state.

The pathology of the hæmorrhagic infarct and its relation to splenitis has been considered in another section, and need not be repeated here.

With the subsidence of the primary disease the spleen diminishes in size, the capsule wrinkles, and resolution is sooner or later complete in the majority of cases. In other instances, however, the resolution is incomplete, this acute process passing into a chronic inflammation. Such a transition is not common after single acute attacks of inflammations of the spleen, but rather after repeated attacks of hyperæmia, such as occur in malarial fevers.

Suppuration rarely occurs, although it has taken place in splenitis accompanying intermittent fever, more frequently though in pyæmia and endocarditis.

The diffuseness of the suppurative process varies. It may be found confined to small points at regular intervals, representing the Malpighian bodies, or collections, varying in number and size, may be scattered through the organ, or, finally, the entire substance of the spleen may present a grayish-pink color upon the eve of disintegration. As free collections of pus occur, the color becomes yellowish-white.

The results of splenitis differ. With the disappearance of the disease (clinically) the swelling of the pulp diminishes and vanishes, the cellular elements which were in excess of the normal disappear, fragments of corpuscles and fat-globules indicating the process of their disappearance. Changes in the framework of the organ occur, especially if there has been frequently recurring hyperæmia; these consist, according to Ziegler, in "fibrous hyperplasia of the pulp, trabeculæ, vessel-walls, and capsule, together with enduring pigmentation. These changes are especially apt to occur when the hyperæmic condition recurs frequently (as in malaria), or when the inflammation takes on a formative or plastic character. Diffuse or circumscribed thickenings then appear on the capsule and may take the form of flattened lenticular nodules, or of large, dense, cartilaginous patches. Occasionally, the entire capsule is transformed into a coarse, scar-like fibrous mass."

If the capsule has been involved, adhesions to the surrounding tissues may have occurred, and thus the spleen becomes united to the stomach, colon, diaphragm, etc.

Symptomatology.—When symptoms immediately referable to the spleen are present at all, they vary in their character according as the spleen-tissue alone, or its covering, or adjacent tissues are involved.

Semeiology.—The attack may commence with chilliness or a well-marked rigor; this is, however, uncommon. In splenitis from embolic infarction or pyæmia chills may be repeated; according to Niemeyer, however, these repeated chills do not necessitate our belief in the septicæmic character of the attack. Pain is usually absent; when present, it consists in a sense of weight or fulness, or a dull aching pain, with, perhaps, some tenderness of the hypochondrium. Should pain of an acute character be present, it indicates an involvement of the covering of the organ.

Fever is seldom high, the temperature range seldom exceeding 100° F., even in aggravated cases, unless inflammation of adjacent structures supervenes, and even should general peritonitis occur the temperature may not rise above 100° F. There is usually an evening exacerbation.

The pulse is in keeping with the temperature, seldom reaching 100.

Nausea and vomiting are not uncommon. At first, the ingesta, mixed with mucus, are ejected; if the vomiting is persistent, bile and even blood in large quantities are thrown up. Blood may also appear in the stools, even in large quantities.

Hæmoptysis and epistaxis are occasionally met with. The tongue is furred, thirst is moderate, there is anorexia, the abdomen may be tympanitic in aggravated cases, and constipation or diarrhœa may occur.

The position in lying is upon the back or left side, to obviate the unpleasant sensation of "dragging" which is felt when lying upon the right side.

With a tendency to a *fatal termination* the tongue becomes dryer, there may be frequent desire for small quantities of water, hiccough, bloated abdomen, involuntary stools, feeble pulse, clammy sweats, and sunken countenance. If the tendency be toward *recovery*, however, the fever diminishes, the pulse becomes less frequent, the respiration quieter, sleep is improved, the morale is better, and the patient complains less of his pains and discomforts. Certain "critical" discharges may occur, viz., profuse sweating, diarrhœa, bleedings from hæmorrhoids, and, in women, the menstrual flow.

Diagnosis.—The diagnosis of inflammation of the spleen is usually difficult, often impossible. The older authors pictured a clearly defined affection presenting few obscurities; modern investigation, however, has very much curtailed the older symptomatology, and with our increasing knowledge the ability to clearly distinguish splenic inflammation has apparently decreased. This is due, however, to the constant elimination of symptoms erroneously attributed to splenitis. Pain in the left hypochondrium cannot be relied upon as being at all pathognomonic of splenitis, for the process may even pass on to suppuration, the entire organ being involved, without marked pain. When pain is at all prominent, it indicates involvement of the capsule. The commoner character of pain, spoken of as dragging, weight, etc., may be mistaken for abnormal sensations growing out of gastric affections, or may be referred to the colon or even the kidney.

Affections of the trunk-wall may also give rise to similar sensations, as well as certain reflex uterine symptoms in women. Much stress has been laid upon the extension of the pain to the chest and shoulder by some observers (Cruveilhier, Embleton, Bree, Coupland, and others), but Mosler in his classical article states that "radiation of the pain toward the left shoulder and half of the thorax is very rare," and in this statement he is supported by equally good authority. From these remarks it is obvious that we are not yet able to assign to the absence of pain any important diagnostic value. If, however, it is present in the characters mentioned, it possesses a relative importance.

Enlargement of the spleen is more important, and can be detected in most instances, unless the inflammatory process is localized and limited. Moderate inflammations give rise to sufficient enlargement to nearly double the normal area of dulness, and in more aggravated cases the organ can be distinctly felt projecting downwards and forwards from beneath the ribs.

As already indicated, the fever is of the inflammatory type and of moderate grade, and presents nothing characteristic. Should the splenic inflammation, however, be simply an accompaniment of pyæmia, or of some other affection during the course of which we know it is frequently developed, its febrile type will be such as is characteristic of the parent disease.

The occurrence of repeated chills suggests the presence of suppuration, which subject is discussed in the section on Abscess.

Reference to the supposed cause is frequently valuable. Suspicious symptoms of splenic inflammation following upon a direct injury to the region of the spleen are much strengthened by the fact of such injury, and the relations between pyæmia, endocarditis, etc., and inflammation of the spleen are so close that we can be satisfied with a train of symptoms and signs which would be inconclusive were they not so associated. Residence in a highly malarial district, or the positive evidence of malarial infection, adds probability to the suspicion of splenic inflammation.

It is not always easy to decide whether a given case is primary or secondary in character. Spontaneous or idiopathic inflammation of this organ is probably an exceedingly rare affection. Instances of supposed idiopathic splenitis have upon more exhaustive examination or after the lapse of a longer period been clearly shown to have been secondary to other morbid processes; this has happened so frequently in the hands of expert diagnosticians that one should hesitate before pronouncing a given case as idiopathic; at the same time we should not commit the error of doubting the existence of this form of inflammation, for cases of splenitis are reported, disassociated from any condition which we are able to show possesses an ætiological relation to the splenic changes.

Prognosis.—The prognosis in acute splenitis depends much upon the occurrence or non-occurrence of the suppurative process. If suppuration can be detected it is of the gravest import, for it is not unfrequently attended by perforation and general peritonitis or perforation of the diaphragm and lung with the well-known consequences.

Recovery may follow the discharge of the abscess externally or into the hollow viscera, although in whatever direction the abscess may discharge itself a favorable result is not to be promised.

That splenic abscess does sometimes pass to a favorable termination is proven by the cicatricial depressions found in the spleens of persons who, during life, did not present symptoms suggesting such a condition.

Treatment.—We can offer but little which has stood the test of experience. Our literature, as well as that of the old school, is peculiarly silent upon the therapeutics of splenitis as well as upon the treatment of splenic diseases in general. In addition to the administration of drugs, some relief of pain may be attained through the use of moist hot applications; the instances of pain sufficiently severe to demand external applications are fortunately not common.

Splenitis being usually secondary to general affections, its treatment is essentially the treatment of the disease during the progress of which it has been developed.

CHRONIC SPLENITIS.

Chronic splenitis may be consecutive to acute splenitis or manifest the character of a chronic inflammation from its very incipiency. Enlargements of the organ, due to such chronic inflammatory process, are sometimes described as "chronic splenic tumor."

Ætiology.—The causes of chronic splenitis are essentially those mentioned in the section upon the General Ætiology of Diseases of the Spleen. The prominence of the malarial influence as a causative factor has been there dwelt upon, and nothing further need here be added. The hyperæmia attending many of the fevers, as, for instance, typhoid, relapsing fever, etc., as well as lesions leading to obstruction of the portal system, and its results, are also common causes of chronic splenitis, and have been mentioned in the same section.

Clinical Course and Symptoms.—Chronic splenitis pursues, as a rule, a very protracted course. It may exist for an indefinite period of time without its presence being suspected, or, at least, without clear diagnostic data upon which to found an affirmative opinion worthy of confidence. It probably precedes acute splenitis oftener than we have felt justified in stating, this chronic inflammatory state furnishing a favorable soil for the development of the acute process upon the application of an exciting cause.

Pain of a severe character is only present when the capsule of the gland is distended or involved in the inflammatory process. Usually, the patient complains of "uncomfortable sensations." These may consist of a feeling of tension, dragging, pressing, or dull aching, etc. They are referred to the splenic region, and may extend forward to the epigastrium or backward to the lumbar region. Aggravation usually follows lying upon the right side, due to the increased weight of the organ which drags painfully upon its attachments.

If the lining of the diaphragm is involved, the pain is severe, and pleuritic in character.

The digestive tract is disturbed. There may be a coated tongue, anorexia, indigestion, nausea and vomiting, sometimes of blood; flatulence, constipation or diarrhœa, which may be bloody; the stools may even consist of pure blood. These hæmorrhages from the stomach and bowels are not unfrequently followed by considerable relief, which is, however, but temporary.

Fever is not high, and is attended by evening or night exacerbations; there is nothing characteristic in the temperature curves. The pulse, during the earlier stages, is slow or very slightly increased in frequency, and only becomes markedly accelerated in the advanced period of development (Bree).

With the advancing enlargement of the spleen the characteristic indications of blood deterioration become gradually more manifest; the skin and mucous membranes blanch, there is dyspnœa, palpitation of the heart, increasing emaciation, effusion into the peritoneal cavity, and occasionally into other serous cavities. Toward the close of life hiccough with vomiting and diarrhœa may occur.

Diagnosis.—If a patient comes to us from a malarial district, and especially if he presents a history of malarial infection or obstructive vascular lesion, complaining of uncomfortable sensations in the region of the spleen, or of more or less acute pain extending to the left chest and shoulder, or to both shoulders, and if he also possesses a pale, sallow, anæmic appearance, and a physical diagnosis reveals enlargement of the spleen, we may feel quite confident that chronic splenitis exists. The diagnosis is not by any means always easy, a variety of affections proving confusing by means of their resemblances to splenic enlargement.

We may mention first, certain changes in the spleen itself, viz.: leucocythæmia; the progressive increase in size of the spleen, in association with the anæmia and certain symptoms of a subjective character common to splenitis, may deceive the observer in the earlier stages of the affection or until a microscopic examination of the blood is made, when the disproportion of the blood-corpuscles will enable a positive diagnosis to be made.

A simple *impaction of the colon* may simulate enlargement of the spleen; it may also be associated with hypochondriac pains and possibly with anæmia, and thus resemble an inflamed spleen.

Such a tumor, however, is irregular on its surface, and the irregularity can be felt upon palpation; proper means will also empty the bowel and make clear the diagnosis.

Morbid growths associated with the omentum are generally differentiated by the history of the case, although their physical characters, as determined by physical diagnosis, are of value. Not only do they grow from below upward, but, as a rule, they are harder and larger.

Inflammation, as well as morbid growths, of the kidney may simulate splenitis; error is avoided by chemical and microscopical examination of the urine. The writer has seen a case of tumor of the kidney in which the growth extended upward and forward in such a manner as to resemble an enlarged spleen. It was, however, of greater consistence, and was not attended by a history suggestive of splenic disease. Ovarian growths, after attaining considerable size, have been mistaken for enlarged spleen.

This should not occur if one gives heed to the history of the development, an ovarian tumor growing upward from the lower abdomen.

A resonant zone usually exists between the tumor and the ribs, although the absence of such a zone should not possess too much weight in the diagnosis.

It is also frequently necessary to differentiate between chronic splenitis and certain pectoral conditions, particularly exudation into the left pleural sac, tumors of the chest-cavity, etc. In the exudation attending chronic pleurisy (which is not always attended by a clear history) there are positive signs. The intercostal spaces are bulged, and the distension is not confined to one part of the chest-wall as in some instances of chronic splenic enlargement; the distension is also rather of the entire chest-wall, ribs and spaces than of the intercostal spaces. In chronic pleurisy a tumor cannot be detected below the ribs. Pneumonitis has been supposed to introduce difficulties as regards differential diagnosis, but we can hardly conceive of it.

HYPERÆMIA OF THE SPLEEN.

A physiological distension of the spleen can be observed several hours after the ingestion of food, resulting from the increased pressure in the portal system due to the augmented supply of blood from the gorged intestinal veins, as well as to the obstructed flow of blood from the organ through the splenic vein.

Hyperæmia of the spleen, as a pathological condition, occurs in the course of a variety of affections in which this organ does not appear primarily or essentially involved. Its slight degree of elasticity, due to the supply of muscular elements and elastic fibres, is sufficient to overcome congestions of moderate degree, not so, however, when the cause is constant or frequently recurring.

Splenic hyperæmia may be (1) transient or (2) persistent. It appears as a transient condition especially in the acute infectious diseases, there being not only a distension of the viscus with blood, but a probable interruption or alteration of its function.

Persistent hyperæmia may be the sequence of the transient form or be gradually developed from the beginning. Oftener it is the result of frequently repeated congestions occurring particularly during the paroxysms of intermittent fever. As in other organs, we recognize *fluxion* and *mechanical* (obstructive) causes.

Fluxion Causes.—It is found as a *fluxion* in the fevers, notably the malarial fevers, also in typhus, typhoid, etc. Menstrual abnormalities, hæmorrhagic infarctions, new growths, and inflammatory processes also possess an ætiological influence.

The *mechanical* causes are mainly such as obstruct the portal circulation, cirrhotic and inflammatory changes in the liver, also, less frequently, various heart and lung affections.

Ætiology.—The structural characteristics of the spleen favor the congestive state. Its slight degree of elasticity, its yielding capsule, the delicately walled bloodvessels communicating with spaces of considerable size, all prepare us to understand the reasons of the ready distension of the spleen with blood during the progress of a large variety of diseases. It is obvious that the very conditions which permit this ready enlargement of the organ tend most strongly to perpetuate it.

Alterations in the elasticity of the spleen structure, in the contractility of its muscular elements, or even their paralysis, are supposed to be favoring factors.

Pathological Anatomy.—The spleen is enlarged from a slight degree to many times its normal size. Exceptionally this may not be the case, for the reason that the organ may be surrounded by a capsule which has been thickened by previous inflammatory attacks and which presents an effectual barrier to its distension. There is an increase in weight proportionate to the increase in size. The enlargement is uniform, the capsule is tense or lax and wrinkled, should the swelling have subsided somewhat. The color and consistence vary considerably according to the form of disease with which it appears in conjunction. It may present a reddish or blackish color, not unlike a blood coagulum or placenta. According to Cornil and Ranvier, the pulp may be a light pink in transient hyperæmia, due to the increase of white blood-cells. In determining the consistence one should not lose sight of the rapidity of post-mortem changes in this organ.

Congestion in the spleen, perhaps less than in any other organ in the body, tends to terminate in its common sequence—inflammation. Its protracted presence, with absence of inflammatory danger, is a common observation.

Microscopic Examination.—In the earlier part of its course we cannot discover new elements, therefore we must refer the enlargement to *fulness of blood* and, possibly, to serous infiltration or, what is highly probable, in protracted cases especially, a temporary multiplication of splenic elements. This can, in fact, be clearly recognized in instances of splenic congestion of long-standing constitutional hypertrophy.

It has been said that the spleen may be congested and yet the structure remain normal. In slight congestions of short duration this seems true, so far, at least, as present means of research enable us to investigate. In the higher grades of protracted congestion, however, it is more difficult to support such an assertion, as the line of demarcation between the congestive state and ill-developed inflammation is not at all clearly defined.

Symptoms.—The symptoms are few in number, and not well marked in the majority of cases. They are prominently: 1, pain; 2, anæmia, manifested particularly by pallor; 3, sensitiveness.

Pain is notable by reason of its absence. Few patients complain of pain. When it exists as a prominent symptom, it is probably due to accompanying inflammatory changes which may supervene upon a chronic hyperæmia, or to previous alterations in the capsule, lessening its elasticity and consequently resisting the distending force, thus leading to compression and pain. When acute pain exists it is of the character described under the heading "splenitis." It is not uncommon, however, to hear complaints of "tension," "dragging," "tightness," "uncomfortable," etc., in the left hypochondrium.

Tenderness.—While pain is seen to be an uncommon symptom, tenderness is of frequent occurrence, for the majority of patients suffering from splenic congestion complain of tenderness in the left hypochondriac region, which, however, may require rather deep pressure to elicit.

Anæmia.—"Although anæmia is commonly enough associated with enlarged spleen, due to a variety of causes, it has not received proper consideration as a symptom of excessive splenic hyperæmia" [Niemeyer]. This author, arguing from his own and Greisinger's observations, refers the sudden anæmia accompanying, for instance, intermittent fever, mainly to mechanical causes, claiming that the degree of the anæmia bears a close relation to the amount of swelling of the spleen, and that it is observed to fluctuate with the varying size of that organ. The marked anæmias observed, especially in children, during intermittent fever, which are so abrupt in their beginning and ending, he believes can only be explained by deeming them due to the withdrawal of blood from the general circulation and its temporary storage in the spleen; this statement is plausible, but cannot be accepted without mental reservation.

Diagnosis.—Most instances of hyperæmia of the spleen are discovered simply because the observer is aware that the affection he is treating is one in which splenic congestion frequently occurs. This statement is a sufficient hint to the novice to be upon his guard, and to search for this condition in the treatment of diseases of which it is known to be a common attendant, whether its presence be heralded by symptoms or not.

A knowledge of its presence depends upon the methods of physical diagnosis. If the spleen is much enlarged and possesses a considerable degree of consistency, its lower and anterior border may be discovered by means of *palpation;* if, on the other hand, it is soft, as it frequently is, it will elude this means of investigation.

Percussion is more reliable in its results, and is often the only available means of positive diagnosis. Marked enlargement of the spleen causes more or less prominence of the hypochondriac region, and as the organ projects well into the abdominal cavity we may be able to clearly discern its shape by inspection alone.

Clinical Course, Results, etc.—Hyperæmia of the spleen, as it appears in most of the infectious diseases at least, disappears with the parent disease, or soon afterward. Such is not the case, however, when the cause is permanent or recurring, as, for instance, in hyperæmia due to obstructive lesions or recurring attacks of intermittent fever.

Death has occurred, according to a number of observers, from the rupture of the enlarged and softened viscus, manifested by the usual symptoms of internal hæmorrhage and of shock. The common result of protracted hyperæmia is hypertrophy.

Treatment.—From a consideration of the ætiology of splenic hyperæmia we must conclude that, as an independent affection, it is comparatively seldom an object of treatment. Our remedial measures are rather directed toward the removal of the affection causative of this condition; this accomplished, the congestion of the spleen usually rapidly disappears. Our main reliance is upon drugs; still, some success has been attained in obstinate cases by means calculated to produce contraction of the spleen—notably *electricity* and the *cold douche.*

ABSCESS OF THE SPLEEN.

Abscess of the spleen occurs as the result of both *acute* and *chronic inflammation*, but especially the latter. Its origin and progress are frequently obscure, the disease travelling its course in a most insidious manner. Instances are reported of abscess involving the entire organ, converting its thickened and distended capsule into a mere retentive membrane, and attended by such trifling conditions as gastric catarrh, etc. That not unfrequently the first suggestion of splenic lesion is the group of symptoms produced by the pressure upon neighboring organs of the enlarged and suppurating spleen, is the testimony of many observers.

The frequency with which abscess of the spleen is associated with the *pyæmic* process is familiar to all.

Infarctions resulting from cardiac emboli perhaps stand next in order. Abscesses resulting from such infarctions are at first small, but from coalescence may involve much of the gland. Points of similarity will be discovered between abscesses of pyæmic and embolic origin.

Hydatids may likewise lead to abscess. Collections of pus in the spleen may be found in large quantities, involving even the entire organ; or, in disseminated abscesses of variable size, as already indicated; and finally, diffuse infiltration may occur.

It is natural to infer from the delicate structure of the spleen that the suppurative process would be one of rapidity and peculiar destructiveness. Facts, however, do not support such a hypothesis. The reticular tissue of the organ presents considerable and unlooked-for resistance to the process, and withstands for a considerable period the Ishmaelitic pus-corpuscle. In abscess of the spleen from whatever cause the portion of capsule in immediate relation to the purulent collection is augmented in thickness by inflammatory deposits, and the superimposed peritoneum manifests the characteristics of inflammation of a low grade, opacity and vascularization being prominent naked-eye appearances, but only occasionally are layers of inflammatory materials found upon its surface. General peritonitis may take its rise in this localized process.

The termination of abscess of the spleen is by *rupture* or *retrogressive changes.*

Rupture may take place into any of the surrounding parts, cohesive inflammation occurring first. When pus is poured into the stomach, it is followed by vomiting of the same. Pus may be discharged through the diaphragm into the pleural cavity, pleurisy may be excited, and even perforation of the lung with admission of the accumulation to the bronchial tubes, and its expectoration. Such cases are difficult to differentiate from empyema, unless the affection of the spleen has been suspected in the early stage. Or it may discharge into the colon, or even into some portion of the small intestine, and pus be voided at stool; when emptying into the kidney, purulent urine is voided, and, according to Wardell, some degree of uræmia may exist.

Perforation of the abdominal wall is the most favorable form of rupture, and pointing occurs at almost any spot in the left side of the abdomen; it may even open to the right of the median line. Escape into the peritoneal cavity is followed by general peritonitis and death.

After an abscess has attained a certain size, its limiting wall may undergo organization into some one form of tissue of the connective-tissue group, becoming fibrous, cartilaginous, and even osseous, the contents of the abscess diminishing and drying as its walls contract.

There is not an organ in the body in which the suppurative process runs its course attended by so meagre and uncertain a symptomatology. Physical signs give us the only certain information of the presence of pus; in fact, we may say that the diagnosis rests upon a single sign—fluctuation, for it matters not how probable the presence of an abscess may be, judging from physical signs of enlargement in conjunction with rigors, fevers, sweats, etc., it must be confessed that *we remain in doubt until fluctuation is manifest.*

The character of the febrile symptoms will depend much upon the existing implication of the peritoneal covering of the spleen; if such complication exists, the pulse changes from its usual full soft character into the smaller, wiry pulse common to serous inflammations; the temperature range is not higher, but perhaps not subject to so marked fluctuations.

Pain in the region of the spleen is usual; it varies much in intensity, and is generally aggravated by the increased pressure of the accumulating fluid.

The more remote pains are felt in the shoulders, especially in the left, involving at times the scapular region. These pains may extend to the neck or chest. Some of the symptoms present are due to pressure upon surrounding organs—viz., *cough*, from pressure upward upon the respiratory apparatus, which is dry, irritating, and frequent; or *nausea*, *vomiting*, and *pain in the stomach*, due to pressure and adhesive inflammation.

A sudden suspension of pain indicates probable rupture of the organ, with evacuation of pus into the stomach or intestines; if the pus is poured into the peritoneal sac, a group of grave symptoms appear which terminate uniformly in death. They correspond closely to the group following intestinal perforation during typhoid fever. The surface becomes cool and damp, the features shrunken, the look anxious, the eye brilliant and restless, the pulse small and feeble. The patient lies upon the back, breathes with his chest muscles, and draws up his knees, and by all the means in his power avoids motion of the abdomen; he may converse intelligently until the final moment.

Diagnosis.—The diagnosis of abscess of the spleen consists in the detection of enlargement of the organ with fluctuation; in other words, the finding of a fluctuating tumor, with attending symptoms of inflammation, and a history of the action of a known causative agency, such as malaria, endocarditis, etc. The presence of decided pain indicates peri-splenic inflammation.

Differential Diagnosis.—The diagnosis is usually comparatively easy if the case has been observed carefully from its early stage; if seen first after full devevelopment, it is possible to be misled.

Abscess of the kidney has been mistaken for that of the spleen; its origin at a lower point, and predominence of manifestations in the posterior part of the body, with morbid conditions of the urine, with an absence of a history of disease-forms upon which splenic disease is grafted, help to a diagnosis. The same applies to encysted kidney.

Abscess of the wall of the lower left chest or upper abdomen—empyema, morbid growths of the spleen, have all interfered with a ready diagnosis; but careful attendance to the history of the case and the course of the local physical changes will prevent error.

Prognosis.—Under whatever circumstances it may occur, abscess of the spleen is of grave import. The prognosis is influenced somewhat by its disease-connections. For instance, abscess of the spleen in association with pyæmia is almost invariably fatal, while abscess from simple splenitis may terminate favorably by absorption or a fortunate rupture. While it is possible for absorption to occur, followed by recovery of the patient, as we know from post-mortem examinations of such as have suffered previously from disease of the spleen, it is undoubtedly an uncommon result, and we must accept with a good deal of allowance statements to this effect which are not supported by post-mortem appearances. Termination by rupture externally or into the hollow viscera may lead to recovery. The improvem [illegible] cceeds the evacuation is often temporary only, th [illegible] t under protracted suppuration. The prognosis [illegible] hen rupture into the peritoneal cavity occurs.

Treatment.—For the early treatment of cases eventuating in abscess of the spleen the reader is referred to the section upon splenitis. In addition to what is there said in relation to the medicinal and general treatment of splenic inflammation we have simply to add here the instruction for the management of the abscess. If the abscess manifests indications of an opening through the abdominal parietes, this should be favored by the application of warm poultices, frequently changed; this not only mitigates the pain, but favors the external rupture which is so much to be desired. Opinions differ somewhat as to the propriety of operative interference. Wardell says: "Harm is generally done by instrumental interference" (Reynolds's *System of Medicine*, p. 457), whereas Flint (*Practice of Medicine*, p. 643) states: "Under these circumstances, an exploratory puncture may demonstrate the presence of pus. This procedure may be resorted to without apprehension of harm."

We are not aware of the existence of sufficient data upon which to found reliable advice relative to this question of mechanical interference. It does not seem to us that anything but good can grow out of the evacuation of abscesses which are pointing externally, much time undoubtedly being saved and extensive destruction of tissue being obviated by a timely opening. It is probable also, when a distinct collection of pus can be diagnosticated by means of physical examination, that with our improved means of aspiration we may empty such an abscess with impunity, the danger of setting up peritonitis seeming insignificant, while the production of "hæmorrhage into the splenic pulp," in sufficient quantity to accomplish harm, is as yet hypothetical. If the abscess is large and sufficiently near the surface to warrant such an effort, the puncture should be kept open by means of a metal tube, as in empyema, the aspiratory canula being convenient for this purpose. This may be removed as soon as the canal is thoroughly established by the ulcerative process. But should the purulent collection be more deeply placed, the canula may be removed after the evacuation of the fluid, and not reintroduced until signs of a distension of the sac are again present.

The care of the patient subsequent to the evacuation of the abscess is important. The treatment should be "supporting;" the drain from the continued suppuration must be met by the most nutritious food, preferably in fluid form, such as meat extracts, milk, eggs shaken with milk, etc. If the prostration is marked and increasing, in spite of treatment, alcohol should be administered. This may be given in the form of brandy or whiskey punches, but not in the enormous quantities frequently urged. One or two tablespoonfuls of brandy added to two ounces of fresh milk, and repeated three or four times in the twenty-four hours, will be sufficient save in very exceptional cases.

The drugs which are of use during this suppurative process must be inferred from similar processes in which we have had more experience, for our literature is quite barren upon this point.

TUBERCLE OF THE SPLEEN.

A development of tubercle in the spleen is quite common as a secondary process. Primary tuberculosis of the organ seems almost unknown.

Tubercle of the spleen may be disseminated or conglomerate. The former is far the more common; in it the tubercles are found both in the parenchyma and the capsule. They are very small, few being as large as a millet-grain; those larger soon present the central opacity and yellowish tint indicative of commencing degeneration, while the smaller remain gray and translucent. Sometimes, when in moderate numbers, they resemble Malpighian follicles, and it is not easy to distinguish them.

When the incised surface of the spleen is examined, the tubercles are seen to project above the surface as minute hemispheres; if seized with the forceps, they are found to possess sufficient consistence to allow of their removal with but slight mutilation, while, on the contrary, the Malpighian bodies are easily torn, and break down in the effort to separate them from the spleen tissue.

The conglomerate form is found more especially in children of a scrofulous diathesis, and presents the characteristics of this form of tubercular development elsewhere. The nodules show caseous degeneration and may, especially if near the capsule, present a reddish border due to hyperæmia of the adjacent bloodvessels.

CARCINOMA.

According to Rokitansky, cancer of the spleen is rare; he has met the medullary variety only, and that in connection with carcinomatous disease in other organs. These metastatic growths appear in the form of nodules scattered through the organ.

The **diagnosis** depends mainly upon the determination of the existence of cancerous disease of other parts in connection with the discovery upon palpation of the nodulated surface of the spleen; percussion reveals enlargement of the organ.

The **prognosis** is, of course, unfavorable, and the treatment purely symptomatic.

RUPTURE OF THE SPLEEN.

The spleen is more liable to rupture than any other of the internal organs, although the normal spleen is very seldom ruptured because of the strength and elasticity of its capsule.

Predisposing Causes to Rupture.—Softening and swelling of the spleen, which occur in localities where severe malarial fevers are endemic, are the most frequent predisposing causes known. It usually occurs during the cold stage of an intermittent, when a rapid swelling takes place to an extreme degree. Rupture may take place from internal hæmorrhage of the organ after softening and suppuration of hæmorrhagic infarction; also from rupture of the splenic arteries or veins, and internal hæmorrhage. This latter cause usually depends upon disease of the vessels, and may produce fracture of the continuity of the organ without a great deal of engorgement. A hæmorrhagic diathesis seems to have been, in a few instances, the cause of rupture. Pregnancy and childbirth also are ætiological factors.

Immediate Causes of Rupture of the Spleen.—The most frequent are sudden blows over the region of the spleen, excessive exertions of the body, falls from some considerable height, besides gunshot or punctured wounds, etc., of the spleen.

The spleen is torn in one or several places, and the rent is straight or angular, extending sometimes to such a depth that the organ is separated into two, or more, parts.

Symptoms of Rupture of the Spleen.—First, there is severe pain, felt over the region of the spleen, which may extend generally over the abdomen. Then come the symptoms arising from loss of blood, as paleness, cold hands and feet, small pulse, anæmic spasms, filling up of the abdomen with blood, and rapid death. Death almost always ensues within twenty-four hours after rupture, and peritonitis hardly has time to make itself manifest.

We are aided materially in the diagnosis of rupture of the spleen if any of the predisposing and immediate causes of rupture are present in the patient. In rupture of the liver, kidney, or bladder, peritonitis is always present, and the seat of the pain is not about the spleen. If there is perforation in any part of the alimentary tract below the cardiac end of the stomach, there always escapes into the abdominal cavity considerable gas. Gas is never present in rupture of the spleen.

The therapeutics and procedure to adopt in rupture of the spleen are a matter of speculation only, and not worthy of serious consideration.

WAXY SPLEEN.

This degenerative process takes place oftener in the spleen than in any other organ of the body, perhaps with the one exception of the kidney.

There are two forms of waxy spleen: one is the so-called *sago-spleen*, where the degenerative process has been principally confined to the adenoid sheaths of the vessels; and a *diffuse* form, where it is deposited equally throughout the organ.

In "*Sago-spleen*" the organ is almost always enlarged, firm in consistency, and still elastic. Usually, there is a large amount of blood in the spleen; when the surface is cut, the adenoid sheaths or Malpighian bodies appear as bright shining spots over a blood-red surface. These spots are semi-transparent, and look like small grains of boiled sago.

If a solution of Iodine in water is brushed over the surface of this sago-form of degeneration of the spleen, the transparent points will change to a brown color. A section stained and examined under the microscope appears, with transmitted light, light yellow at the sago-points, while the surrounding healthy tissue is translucent. If the disease has advanced to a considerable degree, the whole adenoid tissue is replaced by this homogeneous material. If to a less degree, only the reticulum in the Malpighian corpuscles will show this degenerative change. The exerted pressure upon the lymph-cells caused by this thickening may destroy them, and they themselves may undergo waxy change.

The enlarged waxy Malpighian bodies sometimes produce sufficient pressure upon the pulp-tissue to cause its atrophy, leaving only the diseased Malpighian corpuscles.

Diffuse Amyloid Spleen is that condition in which the organ as a whole undergoes waxy degeneration.

The Malpighian bodies are not visible, the cut surface has a smooth appearance, cuts and looks like bacon; is heavy, hard, and inelastic, the edges are round, and the whole organ enlarged. With a watery dilution of Iodine the surface is uniformly colored a darker brown.

In this diffuse form of degeneration the pulp is the principal seat of disease.

The connective tissue, framework, and pulp-cells undergo the change, become much enlarged, impinging upon the Malpighian corpuscles; they atrophy and disappear, and the whole organ (coats of arteries, veins, and lymphatics) is one amyloid mass.

A section undergoing diffuse amyloid degeneration stained with methylanilin violet shows the Malpighian corpuscles little affected, looking more fibrous than usual however; the number of lymph-cells are usually diminished, the central artery is red in color, showing that it has undergone some waxy change, but the Malpighian sheath of adenoid tissue about the artery still stains blue.

In the pulp, where the greater change takes place, the walls of the sinuses and pulp-spaces are a reddish-violet, and even under low powers appear homogeneous and glistening. Within the sinuses the endothelial cells do not take a red color, although they appear, some of them, to be undergoing waxy change, while others are granular and fatty. The colored and colorless blood-corpuscles lie within the pulp-spaces unchanged.

B. SPLENIC LEUCOCYTHÆMIA.

BY J. G. GILCHRIST, M.D.

Synonyms.—Virchow, one of the most careful students of this condition, calls it *leukæmia*, or *splenæmia;* Huss, *splenopathia*, or *leucocythæmia*. The accepted term for the disease is as in the heading to this article, which, perhaps, is not strictly correct, and yet sufficiently so to be unobjectionable as to etymology, and descriptive of the actual condition. The term means an undue proportion of white blood-corpuscles or leucocytes in the blood, and Gowers (Reynolds's *System of Medicine*, iii., p. 476) thinks, "its orthography and pronunciation might be with convenience assimilated to other terms by spelling it leucocytæmia." The term leucocyte or "white cell" having been quite generally adopted to designate the colorless blood-cell, the term suggested would be eminently proper and satisfactory. *Leukæmia*, meaning "white blood," does not express the fact, and is now quite generally abandoned except by those who may be called disciples of Virchow.

Definition.—By leucocythæmia is meant a condition in which there is a constant excess of white blood-corpuscles in the blood. It is eminently pathological in that this excess is constant, not as occurs in the process of digestion; associated and causative of this abnormality, there is some functional or organic derangement of the blood-making organs, more especially the spleen. The spleen is usually enlarged, though not always; there is some change in the medulla of the bones, in a few instances; and there may be general or local changes in the lymphatics. The splenic enlargement may be considered almost pathognomonic, and it is this feature which gave a name to the disease. The symptoms are necessarily of a grave character, chiefly those expressive of innutrition, and a distinction must be made between the ordinary anæmic conditions and leucocythæmia, as there is a relative excess rather than a loss of some of the sanguineous elements. In anæmia the blood is thin, color diminished, and evidently deficient in many of its constituents; in leucocythæmia the changes are only to be accurately detected by the microscope, as macroscopic characters are negative, to say the least; there may be changes in coagulability, and perhaps a slight change in color; but without the microscope the diagnosis can only be a more or less reasonable conjecture. Merely subjective indications should never be considered sufficient evidence upon which to base a diagnosis; in this respect, as in therapeutics, we must proceed upon the time-honored homœopathic plan, and secure the totality; and for this purpose the appeal to the microscope is indispensable.

History.—In common with quite a number of morbid conditions, leucocythæmia is frequently spoken of as a "new disease." So far as full recognition of its character and significance is concerned, this is quite true; but, again, like many others, it is probably as old as humanity, many circumstances conspiring to prevent a complete understanding of the phenomena observed. In the first place, the absolute ignorance of the physiology of the spleen, until very recently; the confused and conflicting theories of the nature of pus; the absence of definite knowledge of the source and destiny of the blood, all operated to delay a comprehension of causes, pathology, and symptomatology, to say nothing of therapeutics.

To those who are familiar with the rapid advances made in exact scientific knowledge during the last twenty years, it is not at all surprising that the disease under consideration did not receive attention from a former generation of writers. It is true that the changes in the blood were recognized, but the significance of the alteration was not comprehended. Bichat, Barth, Donné, Craigie, Reid, Hughes-Bennett, Velpeau, even Hippocrates, mention "purulent blood," "lymphatic blood," "chylous blood," "imperfect transformation of white into red globules," and the like. So, also, these, and others, noticed cases of enlarged spleen, with or without hepatic lesions or lymphatic derangements, and associated the "chylous" state of the blood with these macroscopic changes. But it was not until Craigie, Bennett, and Virchow, between 1841 and 1846, gave the condition much attention and study that we approach a rational conception. As Gowers (l. c.) says, in a note: "In the above sketch of the history of leucocythæmia I have avoided any discussion of the much-debated question of the priority of the discovery. It is certain that the disease was first fully observed by Donné" (1844), "and Barth" (1839), "and first fully described by Craigie" (1841), "and Bennett" (1845). "If their interpretation was less in harmony with received views than that appended to the independent, and almost simultaneous, description of the disease by Virchow, it must be remembered that modern views as to the nature of pus-corpuscles render their explanation, especially that of Craigie, less divergent from the current pathology than it has seemed to be."

A synopsis of the history would be incomplete were mention omitted of the numerous varieties of leucocythæmia that modern writers are disposed to define. The tendency of the day is to a decided change in the nosology which has so long obtained, and however desirable it may be to have the names given to certain groups of symptoms correct as representative of the more constant and pathognomonic indications, yet there is great danger of running to an undesirable extreme, in this respect, and thus make the "last state worse than the first." In the case of the disease now under consideration, the great and distinguishing feature is the change in the blood; this change may be inaugurated in any of the blood-making organs, the result being essentially the same, both as to the composition of the blood and the pathological lesions in general. Hence it would appear that "splenic," "lymphatic," "intestinal," "myelogenic," and "mesenteric," while unquestionably admirably descriptive, may yet represent a refinement in nosology that would prove more confusing than helpful in actual practice. This would seem to be the case when it is remembered that there are few, if any, cases in which the initial lesion is distinctly traceable to any one of the blood-making organs; to some extent they all participate in the morbid action, and if this rigid classification is to be pursued, we must add a group such as the "splenic-hepatic," the "lymphatico-splenic," and the like. The arrangement of subjects for this work specifies the *splenic* form of leucocythæmia as the title for this article, yet I prefer to treat of the disease in accordance with the views expressed above.

Ætiology.—The causes of leucocythæmia, whether predisposing or exciting, are quite obscure. In a few words, it would seem that any condition of body, accidental or permanent, which is characterized by great waste, and in which repair is deficient even while material therefor is abundant, might be considered causative. In other words, there is excessive production with deficient organization. We would, therefore, expect this disease to succeed severe illnesses or accidents, when, either from poverty, constitutional vice, or endemic influences, nutrition is interfered with. Whether the initial lesion is in the spleen, lymphatics, or medulla of the bones, there must be an hyper-activity as the starting-point, some defect in production, rendering what should be plastic matter incapable of organization. Considering this subject in accordance with the usual scheme of ætiological discussion, we shall, I think, find this to be evidently the case.

Race, apart from endemic influences, such particularly as have a tendency to originate morbid action, does not seem to be a factor. As far as observation goes, one people are as much exposed to leucocythæmia as another, unless it may be that any occupation which may be considered national, such as the sedentary life of the Swiss watchmakers, might predispose to anæmic troubles which would possibly lay the foundation.

Heredity is properly considered to exercise an important influence, and yet statistics give very meagre information. There are a few instances recorded in which several members of a family suffered through several generations, and others in which enlargement of the spleen seemed to be transmitted from parent to offspring even when the further development of the disease was not observed. It is not uncommon, in inquiring particularly into family antecedents, to learn that a near ancestor had some "disease of the bowels," or some mysterious "decline." While a consideration of the profound disturbance in all the functions of life that must attend leucocythæmia would argue very much in favor of the affirmative of this question, I am compelled to acknowledge that the study of such statistics as are at hand does not show any marked influence in that direction.

Sex has a decided influence, more men suffering than women, even to the proportion of two to one, all ages being considered; in the climacteric period of woman's life there seem to be as many cases of women as men. Taking all ages together, however, Gowers (l. c.) finds that in the records of 153 cases of the "primarily splenic form" of the disease 100 occurred in men.

Age is a well-marked ætiological factor, although the disease has occurred at all ages, from infancy to senility. The difficulty experienced in determining the period at which the disease commenced operates as a bar to a completely accurate classification under this head. Taking the ages at which death occurred, as Gowers has done, we find the result as follows:

	Males.	Females.	Total.
Under 10 years of age,	2	2	4
10 to 20 "	11	4	15
20 " 30 "	22	10	32
30 " 40 "	35	11	46
40 " 50 "	16	17	33
50 " 60 "	5	8	13
60 " 70 "	5	1	6
70 " 80 "	5	0	5
Total,	101	53	154

The chief points of interest are that at the climacteric age, from 40 to 60, women present more cases than men; after that period the proportion is increasingly less. The ages from 20 to 40, the "vital period of life," in men include more than a third of all the cases. In fact, it seems apparent, assuming that the table given above may fairly represent the frequency as to age throughout the human family, that the periods of life when great changes or crises occur are preferred for the establishment of this disease.

Condition of life, married or single, or with reference to poverty, has been supposed to be an important consideration. The most of our statistical data emanate from men engaged in hospital work, or in large public institutions, and their experience leads to the inference that it is a disease of poverty. Others assert that it is common among the well-to-do, but it is almost impossible to procure reliable statistics of the observations of private practice. Judging from my personal experience and that of my professional friends, so far as it can be procured, it would seem that leucocythæmia is a very rare disease, or else cases occur that are not recognized. Certainly, as to the married state, inasmuch as the larger number of cases occur during the climacteric age, it would seem that child-bearing is not causative.

Previous diseases, particularly those of a chronic character, seem to have the very greatest influence in determining leucocythæmia. It is to be regretted that the collections of reports are inconclusive in this very important particular. It seems that it may justly be concluded that there are two well-marked general forms of the disease, the acquired and the hereditary, and that neither of them is acute or of sudden establishment. Under nearly all circumstances the first stages are unobserved, and none can state when the disease commenced. In the case of infants and children some notable departure from health is usually observed in one or both of the parents. Taking the statistics of Ehrlich as a basis, we find that intermittent fever could be distinctly charged with responsibility in one-fifth of all the cases. In other instances, while no distinct history of previous intermittent could be traced, the sufferers resided in a notably "malarious" district. These two classes together make up a total of one-fourth of the 150 cases collected by our author. When typhoid fever, or some other malady, has been the commencement of the leucocythæmia, there has always been such a condition of anæmia that unusual functional activity of the blood-making glands has been necessary to restore the waste, and what commenced as a purely physiological process, because conservative, becomes pathological or destructive. An article by Dr. J. S. Mitchell, of Chicago (*U. S. Medical and Surgical Journal*, vii., p. 220), apparently a report made to the *Chicago Academy of Medicine*, giving the history of a case of leucocythæmia, closes as follows: "With our present knowledge of this affection, I am strongly inclined to the belief that it is exclusively a drug-disease. It is observed in homœopathic practice only in patients who have previously undergone a long course of drugging, either at their own hands or those of some 'regular' physician. I do not now recollect the history of a single case in our literature. Jahr in forty years met with no case. Bæhr does not speak of the disease. Raue merely gives it a few lines, evidently from no personal knowledge, but to call attention to the affection. Again, it seems always to appear as a secondary affection in those who have taken a 'heap of medicine,' and for a considerable time. The blood, poisoned by drugs constantly absorbed into its mass, at last loses its vitality as a tissue, and when that is lost to the economy we may reasonably expect death if it be not speedily restored." This was written as early as 1872, and yet I think a cursory reading of the literature of the subject will lead the majority to conclude that drugging has much to do with causation. True, some forms of morbid action seem to have a direct causative influence, yet such conditions are almost invariably those that are most heroically treated. At present I am strongly disposed to consider drugging an ætiological factor of the first rank.

Pathology.—In approaching a discussion of the pathology of splenic leucocythæmia, the paucity of physiological knowledge causes a considerable degree of disinclination to the task. That the spleen has some definite function in connection with the blood, that it is an important organ in the economy, is sufficiently patent; that it varies greatly in size in different individuals, or even in the same person at different times, sometimes appearing in a rudimentary form, and again in what might be considered hypertrophied; that it has been destroyed accidentally or removed designedly without destroying life, or even impairing health or nutrition; these, and many other, facts are well known; but owing to the apparent manner in which other organs assume its functions vicariously, the impossibility of examining its products, it being a ductless gland, and its position removing it from external examination under ordinary normal conditions, all this, I repeat, makes a study of its physiology largely a matter of inference and conjecture, and throws corresponding obstacles in the way of studying its pathology. I think it may be assumed, however, that a notable pathological lesion of a kind to induce leucocythæmia must often, if not always, prove secondary or complementary to similar changes in other of the so-called blood-glands, or blood-making organs, more particularly as splenic loss, at other times, is not characterized by the remarkable increase in leucocytes in the blood. Assuming that this constant and permanent change in the blood, the distinguishing feature of the disease, is due to a hyper-activity in cell production, we must first inquire as to the source of the white blood-cell, and its normal destiny in the animal economy. Let us review the study of the blood, therefore, particularly with reference to the manner of its formation, so far as the corpuscles are concerned.

The blood, which some one has practically termed "fluid-tissue," is roughly divisible into two parts, solid and fluid. The fluid portion, presumably designed as a vehicle for the solid ingredients, holds in suspension the inorganic salts necessary to repair waste. With this, in the present instance, we have no concern. The solid portion is corpuscular, consisting of the flattened "red cells" and the spherical "white cells" in the proportion of one white to from 300 to 400 red. This proportion varies largely at different times, in the same individual, not inconsistent with perfect health. The proportion should not rise above one to a hundred, or below one to five hundred, as such a departure from the standard would argue a corresponding deterioration in health. The question engaging the attention of students now, and for many years past, is the origin and destiny of these corpuscles, and what relation they sustain to each other.

There can be little doubt that the white cells have more than a single purpose, yet, perhaps, the two most important may be considered the formation of the red cell, and a material contribution to tissue growth. The ductless glands, notably the spleen, and probably the thyroid and thymus, together with the bone-marrow, are the sources of supply, the manufactories of these bodies. Perhaps the lymphatics generally are engaged in similar work. Without going into the subject at length, it may be noted that the veins contain a much larger number of leucocytes than the arteries belonging to these glands, and that their number is greater in the whole volume of the blood during active digestion, when the glands are physiologically hyperæmic. Like many other natural processes, however, the product is greater than the wants of the body, and a large proportion of those in the blood perish or fail of full development. Starting out in the current of venous blood, the leucocytes are carried to the lungs, where they receive the principle of life which fits them for their tissue-forming destiny. There can be little question, although there are many obstacles in the way of arriving at any definite knowledge of the process, that all the white cells do not pass through the same process of development. What proportion of the whole number become germinal matter we have no means of knowing; neither can we tell at what period of their development, or in what part of the body, the final change occurs. The cells have never been observed undergoing change, and the whole matter is almost purely hypothetical, while still resting on a reasonable basis of established fact. That is, the development of bioplasm has been sufficiently studied and observed to afford a fair knowledge of what must be the process, conceding that the leucocyte is bioplastic, a matter, I apprehend, that cannot be disputed. The appearance of inflammation is characterized by a large increase in the number of leucocytes, which, moreover, assume amœboid properties and characters. This tends to prove that there is overproduction of white cells when the conditions are favorable. The pseudo-growth, as characteristic of inflammation, traced directly to the germinal properties of these cells, and the study of repair through the medium of lymphatic organization, in cases of traumatism, seems to prove the bioplastic nature of these bodies. The fact that pus seems to be solely derived from the same source, that is the pus-*cell*, the pathognomonic element of the product, furnishes a clue to a method of disposal of the superfluous elements.

By studying processes such as the above, and others that suggest themselves to the student of pathology, we can determine that a certain proportion of the leucocytes germinate and duplicate, as protoplasmic substance, forming at least a considerable source of supply in nutrition and repair; some writers assert that all new tissue is formed, and all repair proceeds, from this source alone. We can also determine that a large proportion are converted into red corpuscles, and perhaps this is their most important destiny. Where this change occurs, we cannot tell; nor can we know, with any means of observation at present available to us, whether the leucocytes from the blood-

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glands alone form the red cells, whether the lymphoid corpuscles from the lymphatics have such a destiny, or whether they are indiscriminately used for that purpose. There being no appreciable differences between the lymphoid corpuscle as it leaves the lymphatics, and the leucocyte as it is found in the afferent blood current of the ductless glands, we are justified, perhaps, in believing that the destiny of each is the same, and circumstances determine which shall become new tissue, and which red cells.

Turn now to the red corpuscle. As already stated, it is born of the white cell, but in what manner, or in what place, is not definitely known. We know that the white is polynucleated, at least the nucleus is always double, sometimes multiple. The general opinion is that the red cell is not nucleated, even while a few good observers hold to a contrary belief. Even when a nucleus has thought to have been demonstrated, it is usually single. This would indicate that the white cells being far less in number than the red, and polynucleated, the red cells are formed by gemination, or some other form of duplication, and that this process is carried on in some of the glands, as the spleen or the medulla of the bone, or in both. At all events, we have excellent reasons for believing that "the transformation occurs only at an early epoch in the development of the cell, before it reaches the circulating blood," as Virchow remarks, "and that when it has reached the latter it has become a 'simple' not a 'specific' cell, and its further transformation into a red globule is impossible." The white corpuscles which are observed in the blood, I believe, are those which have escaped development into red cells, and are destined to form new tissue, or perish, as the case may be.

The remaining point of interest is the duration of life in the red cell; does it make more than one circuit in the circulation, or does it perish when a single circuit has been completed? The answer must be unsatisfactory. We know that the red cells reaching the lungs from the venous circulation are changed in color, sometimes, apparently, altered in other physical characters, but that the imbibition of oxygen at once restores that which it had lost, and the most careful examination cannot detect any difference between the cells just leaving the lungs and those fresh from the supposed place of formation. Even assuming that the bile represents what has been called "the corpses" of the blood, the product of the decomposition of the red cell, the amount is not sufficient to account for the mass of these bodies that must undergo destruction if they have a life only extending through one circuit of the body. My own impression is, like many problems in physiology only inferentially proved, that the red cell once formed, other and subsequent changes, particularly those of a degenerative character, are molecular or atomic. Certain cells, however, perish in mass, either by fatty change and absorption or in some other manner, but there is not sufficient evidence that this destruction is an unvarying event.

Now, we determine the following facts, or reasonable hypotheses, with reference to a physiological state of the blood:

That the blood essentially consists of organic and inorganic elements, floating in the serum as a vehicle, or contained in solution in the same as a menstruum.

That its vital properties depend upon a just proportion in the number of the organic elements, such proportion ranging from one white to from 300 to 500 red corpuscles.

That the white corpuscles are the parents of the red cells, probably their sole progenitors.

That the white cells, also, are tissue-forming or bioplastic.

That the red cells convey oxygen to the tissues, as their chief, if not only, function.

Finally,—and in this connection the most important consideration—the blood-glands, the lymphatics, and the medulla of the bones are associated in the production of the leucocytes, their perfection, in origin and development, depending upon the functional state of the organs or functions giving them birth.

Necessarily, this is an exceedingly brief and imperfect account of the blood, but it will be found to answer our present purpose, the question now pressing for solution being: what is the significance of the enormous increase of the leucocytes in leucocythæmia, and how is this increase brought about? We will next inquire, therefore, into the condition of the blood found in this disease. It will be necessary to consider this topic under two heads, *viz.*, the macroscopic and the microscopic characters of the blood.

Macroscopic Characters.—An examination of blood from a leucocythæmic patient, whether from active or passive hæmorrhage, might lead some to suspect an ordinary case of anæmia. The blood from a purely anæmic individual, however, is of a pinkish or rosy hue, transparent in advanced cases, and notably watery, facts which should be borne in mind. In leucocythæmia this is not the case; the blood, when fresh drawn, is dark in color, sometimes "chocolate-brown," coagulating imperfectly, in extreme cases not forming a clot at all, but remaining a dark grumous mass. In other cases, somewhat exceptional, however, the color will be grayish or yellow, sometimes dotted with yellowish-white points, and again so much resembling pus that the discharge might be supposed to come from an abscess. A case is mentioned by Virchow, of a *post-mortem* examination in which the blood from one of the ventricles was so altered that an assistant exclaimed, "it is an abscess!"

When a specimen of blood is allowed to coagulate in a glass, it is observed that there are three distinct layers, thus described by Gowers

(Reynolds, iii., 482): "When the change is slight, the coagulation of the blood drawn into a vessel may not be affected; when more considerable, between the ordinary white and red portions of the clot is a layer of softer consistence, composed entirely of white corpuscles, and the red clot is paler and more opaque than usual, and contains many white corpuscles. When the blood-change is extreme, coagulation is imperfect, and a soft grumous mass results, chocolate-brown in tint, often containing white or yellowish points—an appearance that has been likened to that of softened spleen. . . . . In rare cases clots have been found of a slimy consistence and semi-translucent appearance, resembling certain nasal polypi. If the fibrin is separated from the blood by 'whipping,' and the defibrinated blood allowed to stand, it separates, as Donné first pointed out, into three layers, the red corpuscles sink rapidly to the bottom, and constitute a lowest red layer; above this a pale layer, consisting of the white corpuscles, and above this is the layer formed by the liquor sanguinis, from which the corpuscles have sunk." These appearances are pathognomonic, and should be conclusive evidence in differentiating from simple anæmia; there is a difficulty, however, for clinical purposes, common to many morbid states, in that there are many shades of degree, and many complications in the majority of cases. Consequently, if we rely upon the gross symptoms of the disease we expose ourselves to mortifying errors of diagnosis. Fortunately we are not thus hampered, and the microscope affords us testimony of the utmost value.

Microscopic Characters.—As already remarked, the distinguishing feature is a permanent increase in the number of white blood-cells, not such an increase as is noted during the process of digestion, but a persistent one. Associated with this fact are two others, a corresponding diminution of the red cells, and a diminution in the corpuscular elements of the blood generally. That is, in other words, as the number of white increase, the red diminish, but there is always a greater loss of red than would be compensated for by the increase in the leucocytes; further, the corpuscles of both kinds, as to number, are far below the standard of healthy blood. We are all familiar with the fact that there is no standard proportion of one kind of cell to the other, the limit being quite extreme; yet when Huss asserts that a case should not be considered leucocythæmic until the white cells are in the proportion of one to twenty, he compels us to withhold a diagnosis until the case has passed beyond all hope of medical aid. Drawn from many sources, Gowers (loc. cit.) has found that in 73 cases the proportion was as follows:

1 white to 20 red,	3 cases.
1 " 12 "	1 "
1 " 10 "	1 "
1 " 7 "	3 "

1 white to 6 red,	1 case.
1 " 5 "	7 "
1 " 4 "	4 "
1 " 3 "	9 "
1 " 2 "	12 "
2 " 3 "	3 "
White and red equal,	21 "
More white than red,	8 "

Our author says: "It thus appears that of seventy-three cases of splenic leucocythæmia, in sixty-four (or 87 per cent.) the proportion of white to red was greater than one to six, and that in fifty-three cases (or 72 per cent.) the proportion was greater than one to four; while in twenty-nine (or about 40 per cent.) the white corpuscles are said to have been as numerous as the red, or more numerous."

As to the diminution of the corpuscular blood-elements as a whole, many methods have been adopted at various times to measure the loss. It was first proposed to estimate it by the loss of coloring-matter, but an actual enumeration can now be made, with our perfected microscopes, taking a number of "fields" and averaging the result. The best method, it seems to me, is Gowers' modification of that of Hayem and Nachet (loc. cit.). The examination is based on the approximately normal standard of 5,000,000 corpuscles to the cubic millimetre. In some of the more marked cases it was found that the result was from 2,500,000, or one-half, to 1,150,000. In the latter case the proportion was 470,000 red to 680,000 white corpuscles. This gave a diminution of the red of one-tenth, an increase of the white of fifty times, and a total corpuscular diminution of one-fifth from the normal standard. The method of enumeration is thus described, which I will quote at length: "The apparatus consists, in addition to the microscope with a good ¼ objective, of (1) a small pipette, holding exactly 995 cubic millimetres; (2) a fine capillary tube, holding five cubic millimetres; (3) a small glass jar in which the dilution is made; (4) a glass cell, or slide with a cell, exactly one-fifth of a millimetre deep, the floor of which is ruled in tenth of a millimetre squares. Various diluting solutions have been recommended in order to change as little as possible the aspect of the corpuscles. It is not well, however, to endeavor to observe the characters of the corpuscles during the numeration. Whatever solution is employed, the corpuscles are, more or less, changed by it. One which answers very well is a solution of sulphate of soda of a specific gravity of 1025."

"The mode of proceeding is simple. A pipetteful is placed in the mixing vessel. Five cubic millimetres of blood are drawn into the capillary tube from a drop in the finger, and then blown out into the solution. The two are well mixed by a glass rod; a drop of the dilution is placed in the centre of the cell, the covering glass applied and secured by springs, and the slide placed on the stage of the microscope. The lens is then focused to the squares. In a few minutes the corpuscles have sunk on to the squares. The number in ten squares is then counted." Taking a number of "fields," the average can be readily obtained. "The white corpuscles may be readily recognized by raising the objective until the corpuscles are fading out of focus, when the greater refractive power of the white corpuscles will render them conspicuous objects."

There are still other changes in the solid portions of the blood that are quite diagnostic. As to the leucocytes, they are often somewhat changed in size, smaller or larger, but not to a sufficient extent to be at all remarkable. The more noticeable changes are that there may be a single nucleus or none at all, sometimes granular, and at others distinctly fatty. Thus there are two conditions represented, viz., immaturity or past-perfection, either of which indicates a loss of specificity or an unfitness for the purposes of life. That the prevailing condition is one of past-perfection may be assumed from the observation that the greater the number of leucocytes the more the fatty or granular characters obtain, and also there is usually an increase in the fibrin. That there is an abortive attempt at physiological development is shown in the few cases in which the leucocytes were smaller than normal. Donné, Virchow, and Bennett observed a number of small granular bodies in the blood, resembling the nuclei of the leucocyte, called "globulins," so numerous, in one case, that there were "eighty globulins to every white corpuscle." My inference is that these globulins represent an abortive attempt at organization, the process only succeeding in segmentation.

The red corpuscles are frequently unchanged, apart from their diminished number. They have been found nucleated, smaller, and paler in color, but not with sufficient frequency to be pathognomonic. The other portions of the blood present changes of an important character, some of them peculiar to leucocythæmia, and some commonly found in all anæmic states. They are chiefly as follows:

Fibrin, which is formed from a union of the fibrino-plastin of the blood-cells and the fibronogen of the serum, should be increased in quantity from the increase in the white cells. In health, the average proportion of fibrin to the volume of the blood is stated as 2.5 parts per thousand. While this is greatly increased in all cases of leucocythæmia, varying from 3 to 7 parts (per m.), according to different observers taking different series of cases, Bennett estimates the average proportion at about 4.8, nearly double the normal standard. It has also been observed that whipping the blood does not produce the long filamentary and elastic fibres as usual, but short granular fibres, which may fall to the bottom of the glass in which the clot is formed, and can only be detected with the microscope.

Iron is diminished from .4 (per m.) to .297. Albumen is likewise supposed to be diminished, but observations are not yet conclusive on this point.

Other substances have been found in the blood, foreign to it in normal conditions, but not uniformly or in appreciable amounts. Here belong glycocol, mucin, glutin, hypoxanthine, kreatin, leucin, uric, acetic, and formic acids.

We find that the blood changes may be tabulated something as follows:

Leucocytes increased.
Red cells diminished.
Corpuscles in general diminished.
Iron diminished.
Albumen diminished.
Fibrin increased.

In addition, the leucocytes are fatty or granular; the red cells decolorized; and an imperfect segmentation of leucocytes resulting in globulins. These changes, which may be considered characteristic, bring us back to an earlier statement, that the process represents one of increased production and imperfect organization, considering the leucocyte to be a germinal body.

Our study of pathology, however, does not end with that of the blood; as a matter of fact, this is studying the result of antecedent processes, albeit these changes are of the utmost importance from a diagnostic point of view, particularly as they are more accessible to observation. We must now briefly pass in review the alterations in the various organs and tissues.

The *spleen* would naturally be supposed to represent important and distinctive changes in structure, perhaps more so than almost any other organ. This is true, and yet the lesions are not at all times such as one would infer from the results. Enlargement is an almost constant occurrence, and yet there is a somewhat remarkable lack of uniformity as to kind. In some cases there is a true parenchymatous hypertrophy; in others the morbid change is confined to the Malpighian bodies; in a few instances there has been spontaneous rupture, and in an equally small number of cases there has been abscess. There is, nevertheless, a quite general feature in the hypertrophy; the enlargement is usually equal in all directions, the general shape and relative proportion of length to breadth and thickness being preserved. The size attained is sometimes almost beyond belief. Thus a case is mentioned by Langley Browne (*London Lancet*, 1877, vol. ii., p. 310) in which the weight was 18½ pounds. The spleen has no constant weight; it varies in adults from 4 to 10 ounces, the average, perhaps, being 6 ounces. Taking this as the standard, the following table, taken from Gowers, will give some idea of the variations in size of the organ as indicated by weight, as well as the lack of uniformity or of any standard of hypertrophy:

Under 1 pound	in 2 cases.
1 to 2 pounds	in 5 "
2 " 3	" 5 "
3 " 4	" 12 "
4 " 5	" 9 "
5 " 6	" 11 "
6 " 7	" 7 "
7 " 8	" 8 "
8 " 9	" 1 "
9 to 10 pounds	in 4 cases.
10 " 11	" 2 "
12 " 13	" 2 "
14 " 15	" 1 "
15 " 16	" 1 "
16 " 17	" 1 "
18½	" 1 "
Cases,	72

The average weight of the 72 cases is a little less than six pounds.

The writer gives another table showing the increase in length, the proportions being quite well preserved, as observed in 56 cases. The dimensions in health, in an adult, are about 5 inches long, 3 inches wide, 1½ inches thick. Remembering that in a normal condition the organ cannot be examined or felt externally, some estimate can be formed of the increase in size in a given case from that of the portion which is accessible. The table referred to is as follows:

Length 6 to 7 inches	in 3 cases.
" 7 " 8	" 2 "
" 8 " 9	" 4 "
" 9 " 10	" 7 "
" 10 " 11	" 7 "
" 11 " 12	" 9 "
Length 13 to 14 inches	in 10 cases.
" 14 " 15	" 6 "
" 15 " 16	" 3 "
" 16 " 17	" 1 "
" 17 " 18	" 3 "
" 18 " 19	" 1 "

The average length was 11½ inches, an increase of 6½ inches, or more than double, while the increase in weight (from 6 ounces to 6 pounds) would go to show that there must be a condensation of the structure, the weight being proportionately increased far more than the size.

As to the appearance of the organ on its external surface, it varies greatly. There are usually some evidences of preëxisting inflammation, adhesions having formed between it and contiguous parts. It has been found quite closely adherent to the diaphragm, the left extremity of the liver, the colon, the stomach, as well as the abdominal parietes; in the latter case there is always evidence of ancient inflammation of the peritoneum, that membrane being firmly adherent to the spleen. The surface consequently varies greatly, being for the most part smooth, and not much altered in color, although yellowish-white spots are observed here and there; apart from these there are few changes in color or appearance, the outline being quite well preserved, with some " exaggeration of the notch on the inner border." On tactile examination it will feel firm, somewhat harder than normal, but elastic. In a few cases there were small abscesses; in others, softening in spots, and (Virchow, *Archiv.*, v. 59), in one case, the " upper half of an indurated spleen contained a small focus of softening, while the lower half was converted into a vast pouch filled with a soft material consisting of *débris* of splenic tissue and coloring matter derived from the blood."

On *section*, the appearances are also not pathognomonic or uniform. In all cases, as a rule, there is a much smaller amount of blood than usual, and the fact pointed out by Virchow, and amply confirmed by all subsequent observers, that the longer the duration of the case, the greater the induration, and the less blood will be found on section, adds much to the force of my statement that the origin of the disease is in exalted functional activity, followed by hypertrophy with progressive functional loss. The color is lighter than normal, sometimes a metallic gray; the fibrous stroma being hypertrophied gives a peculiar reticulated appearance to the cut surface, and the Malpighian bodies are indistinguishable in old cases, but very prominent in the early stages. The microscope shows a large amount of leucocytes in the meshes of the stroma, as well as imprisoned red cells. In fact, the structural characters of the enlarged organ are eminently those of hypertrophy in general, an increase in normal tissue, particularly the fibrous, which gives a density and weight much greater than the degree of enlargement would suggest. There are, occasionally, masses of fat found in the meshes of the stroma, probably due to fatty disorganization of the imprisoned leucocytes.

The *lymphatics* in general are usually enlarged; as a matter of fact, some of the systems of glands are always enlarged. In the larger number of instances, the mesenteric glands are affected; in 140 cases of glandular complications, 29 showed the mesentery particularly affected. In 5 cases all the glands were more or less involved. The table given by Gowers (l. c.) is as follows:

Mesenteric,	29 cases.
Cervical,	24 "
Inguinal,	24 "
Axillary,	21 "
Retro-peritoneal,	18 "
Thoracic,	11 "
Portal,	5 "
Iliac,	3 "
General,	5 "
	140 cases.

Selecting the glandular systems which have the most intimate relation with the abdominal viscera, we find that all but 36 (24 cervical and 11 thoracic) were the seat of either primary or secondary enlargement, including the five cases in which all the glands were implicated.

The enlargement of the glands varies greatly; in few cases is there any uniformity in this respect. The size will vary from that of an almond to a walnut; the latter might be considered the maximum, as few attain such a size, and none, it may be said, exceed it. There are no evidences of inflammation, the glands usually presenting a normal appearance externally, and no adhesions to near parts excepting in rare instances. Microscopic examination shows a quite uniform hypertrophy, no preponderance of one tissue over another, the result being a somewhat coarser texture than normal. On closer examination there is observed a great number of lymphoid corpuscles, the stroma being crowded with them.

The enlarged glands are usually soft and compressible, although occasionally they are firmer and elastic. In rare instances they suppurate, and in still rarer a process of caseation has been observed. Thus we find that, as in the case of the spleen, the enlargement represents an increased productiveness, which in time and from causes not understood results in a permanent increase of size.

The *viscera* generally, including the heart and brain, are variously changed in different cases, depending, I think, upon the duration or energy of the disease. The changes most frequently noted are those growing out of lymphoid deposits, either fatty degeneration, abscess, or hæmorrhagic effusion. These changes seem to be due to loss of oxygenation from the poverty, qualitative and quantitative, of the red blood-cells. In some cases the lymphoid mass will become reddened by exposure to the air, which has been thought to have reference to the abortive attempt to develop red corpuscles.

Another interesting feature is the formation of lymphadenoma, or small lymphoid tumors, in the regions supplied liberally with lymph follicles. Thus the base of the tongue, and the alimentary tract generally, are frequently the seat of these growths, sometimes attaining a considerable size. The gums, the mucous coat of the œsophagus and stomach, are frequently found swollen and pulpy, resulting from lymphoid infiltration, sometimes proceeding to ulceration with hæmorrhage, and at other times becoming gangrenous and sloughing.

From the relation of the osseous medulla to blood genesis, it would be supposed that some notable changes would be observed in the bones in cases of leucocythæmia. Important changes have indeed been described, but in the large majority of instances no difference could be detected. In some cases there was an evident increase in the marrow, to such an extent, at times, as to produce appreciable thinning of the bones, with or without expansion. In others it would be of various degrees of fluidity, slimy and albuminous, reddening somewhat on exposure to the air. In still other cases it would seem purulent, and to all intents and purposes might be considered pus. These changes, while marked and very characteristic when they occur, are far from being ordinary concomitants, so much so that some writers altogether deny their existence. They have unquestionably been seen in about 14 of the cases published, and are certainly in harmony with the known pathological scheme.

This brief and, I fear, imperfect *résumé* of the pathology of leucocythæmia will serve to point out what I believe to be the true natural history. There is first a demand made upon the blood-making organs for germinal elements; some defect in the process determines an abundant supply, but the development is retarded from defects in the forces of organization which we, as yet, do not understand. This increase in production results first in an enlargement of the glands having the increased work thrown upon them, usually a simple hypertrophy; next, in a nutritive loss in the blood itself, with a corresponding loss in the tissues depending upon it for life. We also find a multiple disposition of the excess of leucocytes, in the form of abscess, lymphatic engorgement, or the formation of lymphadenoma. The vitality of the tissues being thus impaired, there are numerous important results; fatty degeneration is quite prominent, and when this extends to the bloodvessels, the coats are frequently ruptured, and hæmorrhage is quite characteristic of later stages, thus robbing the body of blood that can illy be spared, already greatly impoverished and deficient in life-giving properties.

The study of ætiology and pathology now gone over, we are led to the next question of interest: the symptoms resulting from these various and extensive structural changes.

Symptomatology.—If reliance is placed upon subjectivity, so far as diagnosis is concerned, perhaps beyond almost any other subacute or chronic condition, an accurate conception of the case in hand can only be considered a happy accident; it reflects little credit upon the skill of the observer. This is true, to a certain extent, in all stages of the disease, but eminently so in the earlier. The first change, so far as means of observation are concerned, is in the blood; an increasing proportion of leucocytes is the controlling abnormality. There are many symptoms, in very early stages, which are common to most anæmic states, and without a microscopic study of the blood it would be beyond the powers of any to determine the true condition. This is a matter of such importance that it cannot well be too strongly urged. If a cure is obtained at all, judging from the meagre clinical records obtainable, it is in the earlier stages; when splenic enlargement is considerable, anæmia pronounced, hæmorrhages frequent, and adynamia profound, it would seem that a stage of positive incurability has been reached. As soon, therefore, as symptoms of anæmia are observed, particularly if there is pain and tenderness, or fulness in the splenic region, the blood should be examined, and if there is a positive excess of white corpuscles the case must be carefully considered as one of leucocythæmia.

Recognizing the difficulty of deciding when such a condition actually commences, and that it is not often that cases are presented for treatment until a late stage has been reached, the usual course of progression is as follows: In nearly all cases there is a decided *enlargement of the abdomen*, increasing so slowly, however, that it is not at first observed. In cases of primary lymphatic disease this is due to mesenteric enlargement, and will be either bilateral or central; when the disease is primarily splenic, it will be on the left side, or in the splenic region, soon traceable to a tumefaction and enlargement of the spleen. Considerable abdominal enlargement may exist without palpable evidence of splenic tumor, as the viscera are pushed out of place, downwards and inwards usually, and only after some time will the spleen be found below the costal margin. When the spleen can be felt below the ribs, all doubts are usually set at rest. The tumor may be differentiated from other growths by the notch in its margin; at times, however, there may be more than one notch, small ones, not observable under normal conditions, being correspondingly increased with the increase in size of the organ. The size attained by this tumor has already been referred to; in some cases it has extended down to the iliac crests, and beyond the median line of the abdomen, even completely across, and Spencer Wells has seen cases in which the lower margin has been felt through the vagina. The tumor moves up and down in respiration, whether attached to near parts or not, and a friction may be felt by the hand, or heard with the stethoscope. The size is not constant in any case, often being considerably larger after a meal, and sometimes in the morning. Pain is not constant, nor is it usually severe; it seems to be largely spontaneous, that is, it comes on without assignable cause. As a matter of fact, *splenic pain* usually antedates the detection of the tumor, but is of no constant kind or degree of severity. In some cases it is dull and quite constant, probably during periods of continued growth of the tumor; in others it is sharp and cutting, coming on at irregular intervals; in others it is "stitching," appearing after exertion.

Weakness is another early symptom, earlier than visible splenic enlargement; of course, the splenic or lymphatic lesion is initial, but, not being apparent until, in splenic cases, the organ has attained a size to make it apparent below the ribs, we will observe some of the effects of this important organic change long before the cause can be unerringly made out. The weakness may be paroxysmal in the beginning, associated with more or less splenic pain, but later in the case it becomes progressive and proceeds to profound adynamia.

Pallor is marked from an early period; not only is there loss of color in the face, but the mucous surfaces become pale from the loss of coloring material in the blood. The pallor does not differ essentially from that of ordinary anæmia, and is not a symptom of any significance.

Early in the case there are *digestive derangements*, nausea, vomiting, and symptoms of indigestion of great variety, partly due to the encroachment of the spleen upon the stomach, partly to the blood-changes, and partly neurotic, from causes beneath the merely mechanical; such disturbances of force or nutrition as determine the immaturity of the germinal elements, or their failure in organization, have a material influence in the development of symptoms of indigestion or other functional disturbance.

The symptoms of the early stages, therefore, may be stated as abdominal enlargement, splenic pain, splenic tumor, weakness, pallor, and digestive derangement, coming on usually in the order named, and gradually passing into others of a graver character, which remain to be considered. During this stage, however, and, indeed, extending more or less throughout the duration of the disease, there seems to be a constantly elevated temperature; this elevation is not great, usually under one degree, but it would appear that it is quite constant. The temperature has not been noted in all the cases reported, but in those in which it was it has been found to range about 100° F., only falling to normal just before death. It is difficult to account for this rise in temperature, as oxidation is *below* normal, although waste is excessive. The fact remains, however, as one of some clinical importance.

After an indefinite period, other symptoms appear, many of them simple aggravations of those of the earlier group, but more intelligible. There is much *dyspnœa*, due partly to the encroachment of the enlarged spleen upon the chest, and partly to the alterations in the blood, as well as anæmia or irritation of the pneumogastric nerve.

The *heart* is sometimes pushed out of its normal position, in some cases having been found lying transversely. The *circulation*, from a variety of causes, is much disturbed, the pulse being always weak and rapid during such paroxysmal attacks as may arise. There are frequent attacks of palpitation of the heart, and many of the symptoms common to anæmic states. Thus there is often humming at the root of the neck, particularly in the larger veins, and a murmur at the base of the heart. There is frequently some cardiac dilatation and fatty change in the ventricles. The characteristic feature in the heart's action and in the deeper circulation is weakness. The peripheral circulation is feeble, naturally following upon the weakened condition of the heart, but intensified by the general prostration, the changes in the blood, and, probably, by the impaction of leucocytes in the smaller vessels.

Œdema is an almost constant symptom, from causes readily understood. The character of the blood, the feebleness of the circulation, the frequency with which vessels become occluded by masses of lymphoid corpuscles, and the pressure exerted upon vessels by the growing spleen and the enlarged glands, as well as the lymphadenoma that so frequently form, combine to produce very favorable conditions for serous exudation. At times the dropsy of the areolar tissue is so great that the fibres of the deeper layers of the skin are separated, so that the white lines, or *lineæ albicantes*, form. In other cases there is anasarca, quite general, ascites, hydrothorax, or hydropericardium; in a few instances there has been *ascites chylosus*, from the occlusion of lymphatic vessels, an occurrence that should not be rare, from a consideration of the pathology, but which nevertheless seems to be quite unfrequent. These dropsical complications have the effect to add much to the dyspnœa and cardiac insufficiency, besides greatly complicating the case in every way.

Hæmorrhages, spontaneous, are noted in many cases, particularly epistaxis and hæmatemesis; blood is also poured out into the bowels or bladder. The occurrence seems to be purely spontaneous, coming on without assignable cause, and the loss of the vital fluid, even so greatly deteriorated, adds vastly to the prostration and general vital disturbance.

Cough is a common complication, probably due to the irritation to which the pneumogastric is subjected in many ways; it may be dry or loose, indeed of almost any character. When spots of lymphoid impaction occur in the lungs they may break down rapidly, forming vomicæ, or result in gangrene.

The *alimentary canal* is the seat of much irritation, and many important symptoms result. The formation of lymphadenoma in the pharynx and œsophagus will cause dysphagia, and more or less difficulty in feeding; the gums also may be swollen and scorbutic from lymph infiltration, the teeth loosened, and resulting in ulceration or gangrene cause much suffering. The stomach is irritable, from the same causes operating to disturb all the functions, and particularly the encroachment of the spleen and the mesenteric enlargement. Hence, there is nausea and vomiting as an almost constant concomitant. The intestines partake in the general disturbance, and diarrhœa is of very constant occurrence.

The *viscera* generally are more or less affected, so that enlargement of the liver, kidneys, supra-renal bodies, and pancreas, together with the mesenteric glands, may be justly considered parts of the diseased state.

The *bones* may be enlarged and softened, but are not frequently so, although in some cases the softening, enlargement, and distortion were as great as in cases of mollities ossium. In many cases, however, without any external appearance of affections of the bones, they have been the seat of much pain; very frequently the more exposed bones are tender to the touch.

The *urine* is ordinarily very acid, and of a specific gravity ranging from 1020 to 1030; it varies in quantity very greatly, usually being rather diminished in earlier stages and quite profuse near the termination of the case. Urea, uric acid, oxalate of lime, and other inorganic substances, are quite generally increased; this is particularly true of uric acid, which is usually more than doubled. Thus Gowers (loc. cit.) states: "Pettenkofer and Voit found the average of five normal men to be 0.872, while that of a leucocythæmic patient was 1.424, an increase of 64 per cent. Albumen has frequently been found in the urine, not in excessive quantities, but there are no casts nor any of the symptoms of Bright's disease in uncomplicated cases."

The *generative functions* in women are rarely normal; menstruation is usually very profuse in the early stages, sometimes almost amounting to metrorrhagia; in the later stages it is gradually lessened in amount, and ultimately ceases altogether. In a few instances, after the final cessation of menstruation, there was an attack of splenic pain or epistaxis observed at the time the menstrual period arrived. While menstruation was still present, the blood usually showed the characteristics which were found in the blood generally. In the case of men there has seemed to be nothing remarkable in the generative sphere. In one or two cases there was a sudden erection, entirely without sexual excitement, this tendency lasting some days, and then gradually subsiding. It was thought to be due to a "thrombosis in the corpora cavernosa."

The *mental* sphere partakes of the general derangement, and it is not uncommon to find many symptoms of aberration; in some cases delirium has occurred; in others, apathy and inattention have accompanied the increasing physical depression; a few cases of plugging of the cerebral artery, with the well-known symptoms due to embolism in this region, have been recorded. There are no constant and peculiar symptoms of leucocythæmia in the brain or nervous system, apart from those necessarily attendant upon anæmia and the generally impaired condition of the blood and all the functions of life.

The organs of *special sense* partake in the prevailing depravity, but nothing of value or interest in this connection has been observed apart from the eye. Here, as Liebreich has shown, while all the tissues are notably anæmic, there seems to be a characteristic change in the retina seen with the ophthalmoscope; it would be more accurate, perhaps, to ascribe these changes to the fundus generally. The ophthalmoscopic appearances may be briefly enumerated, as the description given by our author is not only too technical to be readily understood by the general practitioner, but few are capable of using the instrument with sufficient dexterity. The veins are bluish-red or pink, instead of the dark color of the normal eye; the retina is thickened and opaque, obscuring the vessels; the whole disk is pale; there are evidences of hæmorrhage, usually small spots, more abundant towards the periphery, not in spots, as ordinarily seen, but in somewhat radiating lines, as if the blood were poured out between the fibres. There are also occasional evidences of small tumor-formations, probably lymphadenoma. Of course, the effects on vision are various; as a rule it is not notably impaired.

Whilst the *skin* is usually pale, as stated in an earlier paragraph, yet this is not always the case. Sometimes it is of a greenish tinge; again of a chalky appearance; at other times, but quite unfrequently, it has appeared colored as in Addison's disease. Profuse and exhausting perspiration is the rule, yet in exceptional cases there is an extreme dryness. Boils and various eczematous and erythematous eruptions are not uncommon.

Such is the semeiology of leucocythæmia, particularly in the splenic, uncomplicated form with which we have now to do. Certainly, the most careless reader must be impressed with the similarity of many of the leading symptoms to chlorosis, tuberculosis, and struma, not to speak of other affections from which a differential diagnosis is not easily made. It is barely within the bounds of possibility that there may be a closer relationship between leucocythæmia and some of these diseases than is now apparent; but our present knowledge does not warrant such a classification.

The foregoing leads to the inquiry, what is the *duration* of a case of leucocythæmia? There is an almost insurmountable obstacle in the way of determining the duration of a case; this is the impossibility of determining its commencement. We have seen that the early stages are very insidious, and that when distinctive features are observed there has evidently been considerable progress made. Taking the best reports obtainable, it would seem that the larger number of cases terminate in about two years. Of a total of 63 cases in which the commencement was ascertained with some degree of certainty, Gowers (loc. cit.) gives the following results:

	Males.	Females.	Totals.
Less than 1 year,	9	4	13
1–2 years,	10	6	16
2–3 "	12	7	19
3–4 "	6	3	9
4–5 "	2	1	3
5 and upwards,	3	0	3
Total,	42	21	63

As to the effect of age, in determining the rapidity of the course, the same author gives the following:

Age at commencement.	Cases.	Duration.
10—20,	11	20 months.
20—30,	18	22 "
30—40,	18	29.8 "
40—50,	12	19 "
50—60,	5	27 "

Of course, this table, giving the results in only 64 cases, cannot be considered conclusive, yet it suggests that, as the larger mortality was in the ages between 20 and 40, and the duration was greater, *i. e.*, the course was more chronic than in earlier or later ages, the period of life in which there is the greatest vigor, the "age of consolidation," resists the morbid influence better than an earlier or a later one.

Unquestionably, complications that may arise very materially influence the duration of the disease. Hæmorrhage, exhausting diarrhœa, or the multiplicity of the tumor-formations, may greatly shorten the period; so also in cases in which there is much fever we would naturally expect a more rapid course.

Causes of Death.—The causes of death, as might be inferred from the foregoing, are various. In the large majority of cases the adynamia increases, all the bodily functions become weaker and weaker, until heart-failure occurs, and death ensues from pure asthenia. In other cases, perhaps second in the order of frequency, hæmorrhage, either external or internal, is directly responsible. When external, epistaxis is oftener observed; when internal, it may be cerebral, thoracic, or abdominal. Diarrhœa causes death in a considerable number of cases, as does pneumonia. In one case there was rupture of the spleen. The natural cause of death from leucocythæmia is therefore asthenia; when occurring from other causes, they may be considered in the light of accidental complications.

Diagnosis.—Whilst there are many symptoms common to anæmia, chlorosis, tuberculosis, struma, and leucocythæmia, a fully developed case of the latter should not be difficult to detect. There are certain signs which may be truly considered pathognomonic, and fortunately they are of a character readily observed and unmistakable. The enlarged spleen and the leucocytic state of the blood once made out, all doubt is at an end.

It is true that excessive hæmorrhage, carcinoma, tuberculosis, and many diseases of the spleen, often show an unusual number of white corpuscles in the blood. There are several factors, however, which must not fail of due recognition. The increase in leucocytes must be progressive; any variability in this respect is fatal to a diagnosis of leucocythæmia; the spleen must be enlarged chiefly in a symmetrical manner and coexistently (perhaps coextensively) with the degree of blood-change. With these two prime conditions, absolutely essential, there must be the general corpuscular loss, already alluded to, and a deterioration in quality of the colorless corpuscle. If it is possible to entertain a doubt when the above conditions are present, the presence of globulins and the increase of fibrin must prove conclusive evidence.

The diagnosis, it will thus be observed, cannot be based upon purely subjective symptoms. The blood must be examined microscopically, and the result will be conclusive evidence, even without any other knowledge of the case. It has been noticed, in an earlier paragraph, that Magnus Huss considers a constant state of the blood in which there is one white corpuscle to twenty red conclusive evidence of leucocythæmia; other writers, however, esteem the proportion of one to six essential. However this may be in the absence of other symptoms, the mere fact that there is a constant increase of leucocytes, decrease of red cells, and decrease in the whole mass of corpuscles, will be the most positive evidence, without a refinement of diagnosis based upon a difference between twenty and six.

Prognosis.—The prognosis, at all stages and under all conditions of causation, it would seem, is highly unfavorable; the course of the disease is usually uninterrupted and terminates in death. There are a few cases in which recovery has followed what might be called prodromal cases, in which the splenic enlargement was slight, and the increase in leucocytes small. Such cases, unfortunately, always permit a suspicion of an error in diagnosis, the pathognomonic symptoms not being present. There are also occasional reports of the cure of well-marked cases in an advanced stage of development, but they are of such rare occurrence that they do not affect the average result very materially. In our own school of practice the clinical records are so meagre that no comparison can be made between homœopathic and other methods of treatment as to mortality; in fact, I am unable to find any clinical reports based upon a microscopic examination of the blood.

Should there be a manifest improvement in the general condition, with a corresponding improvement in the blood, the prognosis would be more hopeful. A general improvement, however, without decided change in the blood, would not suggest anything hopeful. So, also, the occurrence of hæmorrhage, diarrhœa, or extensive œdema, would be highly unfavorable, as well as secondary affections depending upon the character of the visceral lesion and the extent of functional loss or derangement. It has been found that a subsidence of secondary glandular enlargement is indicative of speedy death, and that extensive glandular implication argues an utterly hopeless case.

Gowers (l. c.) states: "Among the symptoms of leucocythæmia that afford prognostic indications, one of the most important is the state of the blood. The greater the excess of white corpuscles, the graver is the condition of the patient, the greater the liability to serious complications, to hæmorrhage, internal and external, and to the diseases of organs which are produced by the accumulations in them of white corpuscles and by the lymphoid growths. It may be doubted whether the asthenia and the tendency to hæmorrhages are not due as much to the deficiency of red corpuscles as to the excess of white, and it is probable that the numeration of the red corpuscles by the hæmacytometer, will afford more definite prognostic information than is forthcoming from a merely comparative observation. Other things being equal, the smaller the excess of white, and the larger the absolute number of red, the better is the prognosis." Of course, when a "good" or a "bad" prognosis is referred to, reference is had to the duration of the case, not to cure; a case that proceeds slowly, assuming a chronic course, might be preferable to one proceeding rapidly, although each will terminate in death, moving along uninterruptedly. It is in this sense that the terms are used.

Treatment.—The embarrassment attending lack of clinical material and accurate knowledge of the pathology and ætiology of leucocythæmia, certainly renders the study of the condition very unsatisfactory; when we reach therapeutics, however, we meet with an almost barren field so far as clinical reports are concerned. Many of our text-books contain not even an allusion to the disease; the few who mention it had much better have left it unsaid, the treatment of the subject being crude, often based upon a misconception, and consequently both valueless and even misleading. Grauvogl (*Shipman's* translation) gives much space to Virchow's teachings on the subject, but to-day the views there expressed are of comparatively little value, as the condition of the blood is treated as an effect, even of a secondary character, whereas we have quite conclusive evidence that it is the prime feature in the disease, and that other associated or secondary symptoms are directly due to the state of the blood. Even in so recent a work as Raue's new edition of his *Special Pathology* the author dismisses the whole subject in less than a page, affirms it to be of sycotic or gonorrhœal (!) origin, and refers to Grauvogl as giving the accepted doctrine. Raue, Lilienthal and Jahr give a list of remedies, but no clinical verifications, and, in fact, a diligent search through our periodical and standard literature gives so few cases that they are almost valueless in this connection. To be sure, the treatment may well be determined by our general knowledge of materia medica, and yet the organic and functional changes are so profound that little confidence can be felt in prognosis where there is such a lamentable lack of clinical testimony. Fortunately, the disease is far from common in this country, seeming to disappear with the disappearance or modification of intermittent fever; in districts that are still notably malarial, practitioners as a rule do not discriminate very closely, and hence there are, probably, many cases treated unwittingly, pernicious anæmia or splenitis being credited with the morbid appearances. Cases occasionally find their way into the journals which seem to bear a very close resemblance to leucocythæmia, but the absence of microscopic examination of the blood forbids a reliable diagnosis.

Judging from the very few intelligible reports available, it would seem that the treatment must vary with the stage and intensity of the disease. Prior to the palpable enlargement of the spleen, the remedy must be selected with more particular reference to the subjective symptoms. When splenic and glandular enlargement become pronounced, the reduction of such tumefaction is of the first importance. When secondary affections, as hæmorrhages, œdema, or embolism, occur, the indications are found in the peculiar symptoms and significance of such complications. Above, and more important than, all this, are prophylactic measures, which will naturally demand the first consideration.

Prophylaxis is to be sought in cases where there is good reason to fear leucocythæmia as a possible sequel to existing morbid conditions. Thus, intermittent fevers with splenic pain, severe hæmorrhages in those who are adynamic from any cause, cases of childbed where labor has been severe, hæmorrhage excessive, and prostration considerable, in short, all conditions characterized by great prostration, innutrition, and exaggerated waste, where there is any tendency to anæmia with splenic pain or tenderness, particularly where malarious affections are endemic, may be considered as threatening leucocythæmia, and measures should be taken to avert it by meeting the earliest symptoms as they arise. No doubt, many such cures have occurred, so far as patient and physician were concerned, unconsciously. In truth, a perfect cure of intermittent fever, or anæmia, may be considered a cure of leucocythæmia in the prodromal stage. The means by which this end is accomplished do not need specification at this time, as the articles on Intermittent Fever and Anæmia cover all the ground. Among the *hygienic* considerations the first will be to provide nourishment in proper quantity and quality, and the avoidance of fatigue, mental or physical, exposure to cold, or any disturbance of digestion. Of course, proper remedies will be used, precisely as in the convalescent stage of the malady under treatment were there no promise of leucocythæmia. As to the *kind* of food to be used, much will depend upon the habits and age of the individual. Animal food is to be generally preferred, largely in the form of soup or broth. The food, being liquid, is readily digested, with little expense of vital effort; but too long continuance, or an exclusive use, of fluid nourishment might disturb digestion and induce atony of the stomach which could well inaugurate the disease which we are striving to avert.

Leucocythæmia having once commenced, the spleen enlarged, and the pathognomonic indications being unmistakable, there are definite indications for remedies, yet the lack of trustworthy clinical verification forbids any attempt to estimate the possibilities. Judging from what we know of the effects of remedies in other diseases in which there are equally grave organic lesions, we would naturally expect something positive from their exhibition in the present instance. As frequently stated already, however, the insidious character of the earlier stages prevents an early specific treatment, or may lead the sufferer into a dangerous delay; cases are usually brought for treatment only after full development and when little hope can be reasonably entertained of recovery. On the other hand, as far as a mere selection of the remedy is concerned, much may be accomplished in these early stages ignorantly.

A case is reported in the *United States Medical and Surgical Journal*, vii., p. 220, of leucocythæmia following "chills and fever," in which "heaps" of medicine had been taken. There were all the classical symptoms, even to the epistaxis, which were met promptly by *China*, *Nitric acid*, *Chamomilla*, *Veratrum*, and other remedies, and great attention was paid to nutrition; in spite of the best-directed efforts, however, the patient died. The autopsy fully confirmed the diagnosis. Here was a case in an advanced stage treated by Prof. J. S. Mitchell, a good practitioner, and yet no curative impression was made at any time.

Dr. E. P. Gaylord, of Detroit, Mich., kindly furnishes the notes of the following case, showing that a prognosis may be quite good if the case is taken in hand early in its development. The case was that of a child, male, about 6 months old, living in a malarious district, the father being of very intemperate habits, and the mother having suffered from intermittent fever, but how recently the record does not state. There were other children in the family, all healthy. This child was anæmic from birth, ashy pale, but not emaciated, had enlarged spleen, but no enlargement of the glands. The blood was examined by Dr. Skinner, of Toledo, and found to be leucocythæmic to a considerable extent, probably one to four, although an exact enumeration was not made. The child nursed from the mother, and no attempt was made at artificial feeding. *China* 2^x was the chief remedy used, with an occasional dose of *Ferrum*, as symptoms seemed to call for it, and a perfect cure resulted.

Phosphorus is recommended for these early cases by Dr. Broadbent (*Homœopathic Review*, xxi., p. 115), but apparently on purely theoretical grounds. So, also, are *Aconite*, *Arsenicum*, *Carbo veg.*, *Sulphur*, *Calcarea carb.*, and *Kali phos.* by different writers. Grauvogl recommends *Natrum*, *Sulphur*, and *Thuja*, but it is not known whether he has verified them in undoubted cases of the disease. Certainly, the remedies alluded to have a theoretical relation to the condition, and could, undoubtedly, be used with much confidence, but exact indications cannot be given.

For the complications which arise, particularly hæmorrhages and diarrhœa, we have more exact indications on general homœopathic principles: *Carbo veg.* for profuse epistaxis; *Elaps cor.*, for passive hæmorrhages of dark blood, in drops, and long continued; *Crocus sat.*, blood black and stringy; *Erigeron can.*, profuse flow of bright-colored blood. *China* and *Phosphorus* will also be useful for the effects of such hæmorrhages in the first instance, and for curative and prophylactic purposes in the second. In fact, on general therapeutic principles, without reference to accidental complications, *China*, *Phosphorus*, and *Calcarea carb.* should prove remedies of the first importance, particularly in cases in which the hæmorrhagic tendency is very marked.

Diarrhœa being usually of a painless, watery character should be met by *Ferrum acet.*, *Veratrum*, *China*, *Sulphur*, or *Phosphorus*. The selection of a remedy would be made on the symptoms of the diarrhœa precisely as though it were the sole difficulty, and the special indications will be found in the appropriate place in this work.

The prevailing sentiment among a certain class of practitioners is to reduce the size of the spleen by any means, regardless of other indications. I believe that this is an error; the reduction of the splenic tumor must be effected by remedies that exert an influence upon the disturbed functions as well. We find, according to Lilienthal, that *Belladonna*, *Conium*, *Iodum*, *Lycopodium*, *Mercurius*, *Nitric acid*, *Phosphorus*, *Rhus*, *Sulphur*, are more particularly indicated (symptomatically) in leucocythæmic enlargement, the remedy, as a matter of course, being selected with reference to its homœopathicity to the totality. For the splenic pain, *Arnica*, *Arsenic*, *Berberis*, *Capsicum*, *Carbo veg.*, *China*, and *Natrum sulph.*, seem to be more closely related.

Finally, to repeat, while no one remedy, or no particular group of remedies, may be considered particularly related to leucocythæmia, there being few, if any, cases without complications that very greatly control the selection, *China* and *Phosphorus* seem to be the most closely related to the disease, and should be carefully considered in every case.

There are some surgical practitioners more "heroic than discreet," who would recommend excision of the spleen when notably enlarged. However proper such treatment is in cases of splenic tumor, in leucocythæmia it could not result other than disastrously. The spleen is only one of a number of organs that are at fault, and its removal would only precipitate a fatal result by reason of the bad effects of the unavoidable hæmorrhage, and the low recuperative powers of the individual. In this connection the operation is only mentioned to be condemned, with no reference to its performance for other conditions in which it is perfectly legitimate.

C. ADDISON'S DISEASE.

BY CHARLES GATCHELL, M.D.

Synonyms.—Bronzed-skin disease, Supra-renal capsular disease; *German*, Addisonische Krankheit; *French*, Maladie d'Addison.

Definition.—Addison's disease is a chronic, constitutional affection, "the leading and characteristic features of which are," to use the words of the distinguished discoverer, "anæmia, general languor and debility, remarkable feebleness of the heart's action, irritability of the stomach, and a peculiar change of color in the skin occurring in connection with a diseased condition of the supra-renal capsules."

So clearly did Addison understand the morbid state which bears his name that very little has been added to his original description in 1855, and the foregoing definition needs only the additional statements that pigmentation of the skin is not essential to the disease, and that in all typical cases a uniform lesion of the supra-renal capsules is found.

Historical.—During the second quarter of the present century several physicians, among them the great Dr. Bright, reported cases of an obscure disease accompanied by discoloration of the skin, but it was not until the appearance of Addison's memoir, in 1855, *On the Constitutional and Local Effects of Diseases of the Supra-renal Capsules*, that the disease was defined and established as a distinct morbid entity. Since that time it has been recognized and studied particularly by Greenhow, Jonathan Hutchinson, and Wilks, of London. The first has collected and arranged the reports of nearly two hundred cases, which, with a masterly account of the disease, form the Croonian Lectures for 1875.*

Ætiology.—The causes of Addison's disease in many cases are involved in obscurity, a veil of mystery enveloping its insidious beginning, but in some cases there is a possibility of tracing the effect to a more or less distinct cause.

Age.—The disease appears in adults during that period when they are most actively engaged in their life-work. The youngest cases in Greenhow's tables were eleven years old; the oldest, a woman, sixty-nine, but the majority were between the ages of twenty and fifty.

Sex.—Males are more prone to it than females.

Social Condition.—This is a disease which rarely attacks the better classes. It is usually developed in working people, those who are accustomed to hard labor.

Hereditary Influence.—Heredity plays no part in the development of Addison's disease. It is not transmissible by inheritance or contagion, yet, being a constitutional malady with local manifestations, it is more than probable that a "vulnerable constitution," *i. e.*, a tuberculous or scrofulous diathesis, is a strong predisposing cause of the disease. Indeed, Greenhow has often seen it associated with tubercular disease of the lungs, with tubercular deposits in other organs, with vertebral caries, psoas and lumbar abscesses, etc.

This association and the anatomical characters of the supra-renal lesions point suspiciously to a tubercular origin.

Traumatism has been made responsible for the outbreak of a certain number of cases. Thus blows and falls upon the back have been followed by the symptoms of this disease.

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* Greenhow, On Addison's Disease, 1875.

Pathology.—*Post-mortem Appearances.*—Post-mortem examinations of Addisonian subjects have revealed, almost without exception, some of the following lesions: 1. A lesion of the supra-renal capsules which Flint calls "fibro-caseous metamorphosis." 2. Fibrous adhesions to the adjacent structures, and involvement of the neighboring nerve plexuses. 3. Discoloration of the skin and mucous membranes of the buccal cavity. 4. Enlargement of the mesenteric glands and of the solitary follicles of the intestines, with *mammillation* of the gastric mucous membrane. 5. Coincident tuberculous deposits in other organs.

The Supra-renal Capsules.—Addison was of the opinion that any change in these organs would be followed by the symptoms of this disease, but more extended observations have proved this to be untrue, and have established the fact that the lesion, in the majority of cases, is a peculiar, fibro-caseous metamorphosis bearing a close resemblance to tubercular degeneration. The capsules are larger and firmer than normal, as a rule, but sometimes they are contracted. This difference depends upon the duration of the disease, the contraction being merely a sequence of the enlargement.

If a cross section of the organ is examined, the distinction between the cortical and medullary portions cannot be made. The normal substance has given place to a firm, translucent tissue, somewhat like cartilage, which turns reddish-brown on exposure, and in which are found nodules of yellow matter varying in consistency from thick pus to cheesy or even cretaceous matter. In this respect the nodules resemble tubercles, showing all the stages from softening to calcification. Another point of resemblance lies in minute grayish nodules occasionally found scattered through the organ and which might easily be taken for miliary tubercles.

The microscopical examination shows that the translucent material is mainly a fibrillated or trabecular connective substance containing lymphoid and myeloid cells, and that the degenerated foci consist of granular detritus, a granulo-fatty change so often met with in other lesions.

The appearance of the capsules varies with the relative amount of organized or degenerated tissue. Thus, the fibrillated tissue may predominate or it may be degenerated to such an extent that the entire capsule will be converted into a thick creamy fluid, which may undergo cheesy or calcareous degeneration. In this respect the lesion follows the course of other low inflammations, as the scrofulous and tubercular, and has led certain pathologists to consider it a peculiar manifestation of those diatheses.

Fibrous Adhesions to Neighboring Structures.—Accompanying the low inflammatory change in the capsules there is a marked proliferation of the adjacent connective-tissue which, in the course of time, becomes fibrous, and may bind the capsules firmly to the kidneys, the liver, the pancreas, the stomach, the diaphragm, or the vena cava.

The neighboring nervous structures, particularly the supra-renal and solar plexuses and the semi-lunar ganglia, are involved in this connective-tissue proliferation. They become enlarged and indurated, though the nerve-fibres proper do not multiply; on the contrary, they may atrophy from the pressure exerted by the surrounding connective tissue, and, at any rate, their function is much disturbed by the compression.

Virchow, Greenhow, and other noted physicians, are inclined to attach great importance to the implication of the nerves, and even go so far as to consider it the cause of the symptoms of the disease.

Pigmentation of the Skin and Mucous Membranes.—This peculiar feature of Addison's disease is due to the deposit of brownish or yellowish pigment granules in the deeper layers of the epidermis, that is, in the situation where pigment is found physiologically in certain parts of the body and in the skin of the negro. The superficial layers of the epidermis are generally free of coloring matter, and the deepest pigmentation is at the layer immediately overlying the papillæ, namely, in the rete mucosum. Occasionally, the underlying connective tissue of the corium is slightly colored.

The mucous membranes of the lips, tongue, cheeks, and gums are frequently discolored in spots, and on microscopical examination the pigment granules are found in the supra-papillary epithelial layers.

Other Pathological Changes.—Enlarged mesenteric and retro-peritoneal glands are found in the vicinity of the diseased capsules. They bear every resemblance to the enlargements that accompany scrofulosis, namely, proliferation of the normal adenoid tissue, with a marked tendency to become softened by granulo-fatty degeneration.

The solitary glands of the intestines often, though not invariably, are found enlarged, and the mucous membrane near the pyloric end of the stomach occasionally presents a mammillated appearance which is due to a growth of reticular tissue around the gastric follicles. This rudimentary tissue easily breaks down and forms small abrasions and ulcers on the surface of the membrane.

In a considerable number of cases enlargement of the spleen has been observed, and in those who were known not to have suffered from intermittent fever during life; but this lesion is not constant enough to be considered one of the essentials of the disease.

It should be mentioned that there is scarcely any emaciation in this disease, and the amount of subcutaneous fat sometimes observed, particularly on the abdominal walls, is remarkable, considering the profound asthenia and nutritive derangements from which the patients suffer.

Complications.—The most frequent complications or lesions observed coincident with the capsular disease are tubercular deposits. It is not uncommon to find manifestations of this affection in the lungs, brain, testicles, and other organs. Caries of the lumbar vertebræ, deep-seated pockets of pus, such as lumbar and psoas abscesses, have been seen in several cases. Yet, it must be borne in mind that many cases present no other pathological lesion than "strumous degeneration" of the supra-renal capsules.

The Theories of the Disease.—The true nature of Addison's disease is not known. Its pathology has not yet been determined, probably on account of the limited opportunities for observation and study, and partly because of our imperfect knowledge of the physiology of the organs involved.

Many theories have been advanced to account for the existence of the malady, but all are open to criticism. First, it has been suggested that it is a peculiar form of tuberculosis; second, that the cause of the constitutional symptoms is not due to disturbance of the function of the supra-renal capsules, but to the lesion of the abdominal nerve plexuses; third, that the primary cause lies in a profound disturbance of the blood.

The first theory is suggested by the anatomical nature of the lesion of the supra-renal capsules, which resembles closely that of tuberculosis; and the fact that the two are often found associated seems to support this view. But it must be borne in mind that many cases have been recorded in which no other pathological condition was discovered than that involving the supra-renal capsules. This would seem to lead to the necessity of considering it a purely local tuberculosis, a position which could not be sustained by the established doctrines relating to tubercular disease.

It is evident that the symptoms are not due alone to disturbance of the supra-renal functions, because other pathological conditions are found, such as cancer, amyloid degeneration, cysts, etc., which have entirely destroyed the capsular tissue, and have done so without developing symptoms of Addison's disease. Physiological experiments on animals have demonstrated, also, that the functions may be abolished without causing the symptoms of capsular disease.

Greenhow, Virchow, and many others, while attributing the disease primarily to the capsular lesion, yet look upon the implication of the nerves as the cause of the constitutional symptoms.

Greenhow assigns the gastric irritability and the feebleness of the heart and respiration to the thickening of the neuroglia of branches of the pneumogastric nerves. Implication of the vaso-motor fibres accounts for many of the nervous symptoms, and even, it is claimed by some authorities, for the pigmentation of the skin.

The objection to the theory is the fact that the nervous lesions are not evident in every case and that the same fibres are not always involved.

Some pathologists look to the blood as the fundamental cause of the disease, but this position is purely speculative, having no foundation in facts, and so far we must admit our entire ignorance of the real nature of this very interesting pathological condition.

Symptomatology and Clinical History.—Addison, in substance, outlines the characteristic features of this disease as follows: "Anæmia, general languor and debility, remarkable feebleness of the heart's action, irritability of the stomach, and a peculiar change of color in the skin," are the "leading and characteristic features." A careful study of the constitutional symptoms leads to the conclusion that they are expressions of anæmia and general weakness rather than of local affections of the organs involved.

The general and *progressive* weakness manifests itself first in a feeling of prostration and lack of energy. Soon the slightest effort seems an herculean task, "the down-cast look, the drooping shoulders, the stooping gait, the arms hanging helplessly by the sides, and the slow and listless movements" speak silently, but impressively, of the patient's debilitated condition.

The involuntary, as well as the voluntary, muscular system shares the general weakness. Consequently, the heart's action becomes very feeble, the pulse being small, compressible, and accelerated, especially after any exertion. Regular cardiac movements may readily give place to palpitation.

The bowels are usually sluggish and inactive, giving rise to constipation, though at times during the course of the disease diarrhœa is present.

The respiratory function is deficient, that is to say, shortness of breath is a troublesome feature if the patient makes even a slight exertion. This breathlessness is probably due to impaired innervation as well as to anæmia.

The general prostration is aggravated by, and it in turn aggravates, existing alimentary disturbances. If the nutritive functions were well performed, there would be a reasonable hope of eventually overcoming the weakness, but more or less disorder is always found and interferes with proper nutrition. Usually there is noted loss of appetite, nausea and vomiting, and, associated with these conditions, some tenderness and pain over the epigastrium and hypochondria. Notwithstanding this marked and persistent disturbance of nutrition the patient rarely grows very emaciated, and the amount of subcutaneous fat noticed is sometimes remarkable.

A great variety of symptoms referable to the nervous sphere may be developed during the progress of the disease. Vertigo, numbness, disorders of sight and hearing, with convulsive movements of the muscles, are found prominently in the list. The mind, as a rule, is clear, but toward the close of the malady the general prostration may be so profound that the patient lies in a drowsy semi-comatose state, not having sufficient energy to arouse himself. During the last stages a low muttering delirium is liable to appear.

Death usually occurs suddenly while the patient is in the act of making some effort, as, for example, sitting-up in bed; it takes the form of a fatal syncope.

The most striking feature of this obscure malady lies in the peculiar discoloration of the skin and the buccal mucous membrane. It is the one symptom that impresses itself most vividly on the mind. This discoloration is a yellowish-brown, dusky or olive hue, and in advanced cases makes the patient appear to belong to one of the dark races. It may be noticeable at various parts of the body or become evenly distributed over the entire surface, but it is usually deeper in some spots than in others. The regions which are sure to be most deeply pigmented are those in which pigment is found normally, namely, the nipples, the external genitals, the axillæ, the groins, etc. The appearance of small, well-defined black spots on already discolored skin is considered by Greenhow a certain sign of Addison's disease.

The coloring matter is sure to be deposited in large quantities at points where there has been a break in the integument, a superficial abrasion, a blistered spot, or a local irritation such as would be made by the rubbing of a suspender. Cicatrices from deep injuries that involve the corium, however, remain pale and contrast strongly with the dusky hue of the surrounding tissue. Bluish-black streaks running lengthwise, near the junction of the mucous membrane and skin of the lips, irregular stains on the gums and cheeks, purplish-black stains on the border of the tongue, are occasionally observed. Local irritation, such as is produced by a ragged tooth, may determine the seat of the deposit.

The pigmentation may begin in the early stage of the disease and be the only distinguishing feature for a long time. Cases have been observed that showed no constitutional symptoms until within a few days before death, whereas the discoloration of the skin was present for a long period. On the other hand, cases have been known to go through the typical course of the disease lacking only the discoloration.

Course and Termination.—Greenhow was the first to call attention to the paroxysmal, or intermittent, course of the disease. From some unknown cause the progress of the malady may be checked and improvement set in temporarily, but in time it will have acquired new force and break forth with renewed vigor, to be again stayed in its destructive course. Every exacerbation, however, carries the patient lower, and each remission leaves him weaker, until finally the affection arrives at a sudden and fatal termination. During the remissions even the discoloration pales to a certain degree, and then intensifies again during the following exacerbation.

The duration of the disease varies greatly, running its course in a time varying from a few days to several years.

Cases are on record in which patients apparently in good health, save a darkening of the skin, were stricken with the constitutional symptoms of Addison's disease and succumbed in less than a week. In such cases the affection is said to run a latent course. On the other hand, cases have been under observation for six years before death occurred. Sometimes the constitutional symptoms are present long before the cutaneous symptom appears.

The termination is always fatal.

Diagnosis.—From the foregoing description of the disease we glean the facts upon which to base a diagnosis. In typical cases the constitutional symptoms conjoined with the discoloration make it an easy matter to determine the nature of the affection, but in anomalous cases, in cases which pursue an irregular course, the diagnosis may become a matter of great difficulty.

Some confusion may arise from the discoloration of the skin, for this may be the result of a variety of causes. Bronzing of the skin is occasionally seen in indigent, filthy persons, merely as the result of uncleanliness. Pityriasis versicolor is characterized by bronzing of the integument of the trunk and limbs. The abrupt outlines of the colored spots contrast strongly with the gradually fading outlines of the discoloration of Addison's disease.

Syphilis has long been recognized as the source of coppery-colored stains of the skin, and when generally diffused, as sometimes happens, a mistake in diagnosis may be made; careful attention to the history of the case will prevent such an error.

Chronic pulmonary and hepatic troubles are occasionally accompanied with general discoloration, but in such cases, also, the clinical history will help to solve the problem.

Treatment.—The general measures to be here considered pertain to the patient's surroundings and circumstances. All physical and mental strain must be avoided, everything, in fact, that will tend to prostrate the patient. Rest is one of the essential elements in the treatment of every case. During exacerbations confinement in bed is demanded.

The patient's diet requires some attention; knowing that gastric and intestinal irritability are often present, with the marked prostration described, it is evident that every effort must be made to sustain the patient's strength with nourishing, yet easily digested, food. The physician is at times called upon to exercise much ingenuity, good judgment, and considerable patience in order to adapt the diet to the demands and needs of each individual case. If hearty food is rejected, the following may prove acceptable: Milk, either alone or with lime-water, eggs, oysters, meat-broths, and the like.

Reasoning on the basis that the disease is allied in its nature to scrofulosis, tonics have been used with more or less success. Cod-liver oil, as a rule, is not well borne, but glycerin may be given as a substitute. Drachm-doses taken three times a day will tend to sustain the patient's strength. Stimulants have been prescribed in moderation.

The most annoying feature of the disease, the persistent vomiting, may occasionally be allayed by the judicious use of ice, soda-water, and brandy, in conjunction with Apomorphia, Oxalate of cerium, and allied remedies; but in many cases it resists all treatment.

The constipation should not be treated with cathartics, because of their depressing effect on the system. It may be treated with electricity. General faradization and galvanization proved valuable in one case reported by Flint.* The improvement lasted two years, but at the end of that time, without apparent cause, the patient suddenly failed, and died within twenty-four hours.

The administration of remedies in the present state of our knowledge is, perhaps, the least important part of the treatment; in fact, we possess no remedies that have made any clinical record.

Arsenicum seems to correspond to the constitutional symptoms of the disease, but it never has proven curative.

Argentum nit. is recommended by Lilienthal.

Iodine, Creasote, etc., might be prescribed on the theory that the disease is of scrofulous origin.

D. HODGKIN'S DISEASE.

BY CHARLES GATCHELL, M.D.

Synonyms.—Lympho-sarcoma (Virchow), Malignant lymphoma (Billroth), Pseudo-leucocythæmia, Lymphadenoma; French, Adènie, Lymphadènie; German, Pseudoleukämie.

Definition.—Hodgkin's disease is characterized by a general enlargement of the lymphatic glands of the body, producing a multitude of symptoms by pressure on adjacent structures, accompanied, in the majority of cases, by enlargement of the spleen and by progressive and fatal anæmia.

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* Pract. of Med., p. 406.

Historical.—In casting retrospective glances over the field of early medical literature there are occasionally met the records of cases evidently of Hodgkin's disease; yet the individuality of the disease was not understood until pointed out by Hodgkin in 1832. The later researches of Virchow, and his masterly description of leucocythæmia, and more recent contributions from other sources, have greatly aided in clearly establishing the characteristics of the disease.

Ætiology.—The causes of lymphadenoma are not understood, and our information on this point is exceedingly unsatisfactory. Heredity plays no part in its development, neither does any recognized diathesis. It bears no known relation to scrofulosis, tuberculosis, syphilis, rheumatism or cancer; yet it has been assigned a position between tuberculosis and cancer. No predisposing cause is known.

Males are more frequently attacked than females. The majority of cases develop between the ages of twenty-five and thirty-five, but some appear in children as early as the fifth year, and Hirschfeld had one patient seventy-two years old.

Almost as little is known about the exciting causes. It has been observed that the pathological process starts near some point where there was local irritation, such as might be caused by a carious tooth, a discharge from the ear, a sore throat, etc. In such cases the nearest glands became enlarged and, in the course of time, the general affection spreads from the local disease. It has been known to follow childbirth, intermittent fever, and whooping-cough.

Intemperate persons are probably more liable to its attacks than the temperate.

Pathology.—*Pathological anatomy.* The main feature of this disease relates to the lymphatic enlargements, which become general as the disease progresses, and even cause metastatic deposits in the liver, lungs, brain, testicles, ovaries, etc. These metastatic tumors possess the anatomical characteristics of the original growths, being both soft and hard, and resemble in nature the metastatic deposits of malignant tumors.

The groups of glands are affected in the following order of frequency: the cervical, axillary, inguinal, retro-peritoneal, bronchial, mediastinal and mesenteric. The individual glands vary in size from a bean to a hen's egg, at first are separate and movable on one another, but ultimately become massed together. Should they produce an inflammatory condition of the over-lying skin, they generally become attached to it; ordinarily the tumors are perfectly movable.

Two forms of enlargement are observed, the soft and the hard. The first variety, on section of the gland, yields a milky juice. Microscopically it resembles the normal gland tissue, consisting of a delicate reticulum well filled with lymphoid elements; it might be considered an immense hyperplasia of the gland.

Unlike the scrofulous, and many other, enlargements of the lymphatics, this variety is not apt to undergo caseous degeneration, but remains for an indefinite period as when first developed. Amyloid degeneration is occasionally observed.

The difference between the two varieties probably lies in the relative amount of reticular tissue and lymph-corpuscles possessed by them. In the hard variety the reticular tissue may be dense with firm fibrous bands running through the substance of the gland, while the amount of corpuscular elements is relatively small.

The enlarged spleen owes its pathological change to disseminated, irregular growths arising from the Malpighian tufts, and resembling, microscopically, the lymphatic glands. Sometimes the splenic pulp is increased in quantity, but this is not uniformly observed.

The medullary portion of the bones undergoes a change, occasionally consisting of peculiar gelatinous deposits of yellowish-red color. Gowers considers it similar to the change which occurs in leucocythæmia and pernicious anæmia.

Other adenoid tissues, as the tonsils, the mucous membranes of the pharynx, œsophagus, stomach, and follicles of the intestine, often present characters similar to those seen in the lymphatics.

No increase of white blood-corpuscles is found in this disease, which is the chief point of difference between it and leucocythæmia.

The anæmia is profound, but the characteristic feature of the condition consists in a reduction of the red corpuscles, which may be fifty per cent. below the normal.

Symptomatology and Clinical History.—Most of the symptoms of Hodgkin's disease are produced by the pressure of the enlarged glands on the neighboring structures. The disease usually begins without warning, by a slow, painless enlargement of the cervical glands. They may reach such a size that the circumference of the neck will exceed that of the head.

These enlargements, and those of the deep-seated glands of the neck, may by their presence interfere with the respiratory, cardiac, and œsophageal functions. Patients have been known to die of starvation from occlusion of the œsophagus, of syncope from paralysis of the heart, of asphyxia from occlusion of the trachea.

In cases where the retro-peritoneal and mesenteric glands are enlarged, the portal circulation may be obstructed and ascites result, or symptoms simulating those of enteric fever be produced. Jaundice is sometimes observed.

Pressure of the cervical glands is apt to cause passive congestion of the brain, and interferes with the movements of the lower jaw.

If the kidneys are involved, albuminuria is liable to be present.

Brain symptoms, such as insomnia, convulsions, and coma are occasionally observed.

Bronzing of the skin has been seen in some cases, which was due to a diseased condition of the solar plexus.

So long as the disease remains local, there is no impairment of the general health, but when it becomes general, progressive and extreme emaciation and anæmia follow. With the appearance of these conditions another set of symptoms is developed. An evening rise in the temperature, profound prostration, exhausting diarrhœa, dropsical effusions into the pleuritic, abdominal, and pericardial sacs, with œdema of the lower extremities and bed-sores, are among them.

They indicate the beginning of the end, for the patient soon sinks into a collapse from which he never rallies.

Diagnosis.—It is impossible in the early stage to predict the future of a glandular enlargement, hence the first local manifestation of lymphadenoma can not be recognized; when the disease becomes general, and the marked local and general symptoms appear, it will hardly be mistaken for anything except lymphatic leucocythæmia. It may, for a time, resemble carcinomatous or sarcomatous affections of the glands, but the similarity is only temporary.

The differential diagnosis between lymphadenoma and lymphatic leucocythæmia must be made by the microscopical examination of the blood. The former malady does not show the increased number of leucocytes which characterizes the latter.

The condition of the spleen also affords valuable help; it becomes enlarged in the early stage of leucocythæmia, whereas in lymphadenoma the enlargement occurs late.

The tendency of carcinoma is to cause secondary deposits in the internal organs rather than to continue the invasion of the lymphatics; their growth is also slower than in Hodgkin's disease.

Prognosis.—This is invariably unfavorable, death occurring sooner or later. Unfavorable signs are found in the profound anæmia, high temperature, and the extreme enlargement of glands situated near vital organs. The younger the patient and the better the previous health, the longer is the duration of the disease. Some cases end fatally in from two to six months, but the average duration is one year.

Treatment.—*Arsenicum* is the only remedy that has a deserved reputation in the treatment of this disease. When pushed to its physiological limit, some cases have been seen to improve, the glands diminishing in size and the general condition improving. Beginning with five-grain doses of the 2^x trit. three times a day, the quantity can be increased a grain *per diem* until symptoms of arsenical poisoning appear.

Extirpation of the glands has been practiced in a certain number of cases, on the theory that the removal of the primary enlargement would prevent the secondary general infection, but the result has not been satisfactory. This mode of treatment is repudiated by Hirschfeld, while Gowers is inclined to favor it.

E. EXOPHTHALMIC GOITRE.

BY F. PARK LEWIS, M.D.

Exophthalmic Goitre is the name commonly given to a series of morbid phenomena the characteristic and most marked symptoms of which are: rapid and violent action of the heart, abnormal development of the thyroid gland, and protrusion of the eyes. It is also known as *Graves's disease* from the early and accurate description of the condition which was given by this renowned surgeon.

As early as 1825, Parry reported several cases of the disease, and Emmert has proposed that the name of the former should be known in connection with it.

The Germans, disputing this priority, and claiming the honor for their countryman, have called the disease *Morbus Basedowii;* while Basedow himself, because of the diathesis on which he believed it to depend, named it *Exophthalmic cachexia—Glotzaugenkachexie*—or *Glotzaugenkrankheit.* Mackenzie, for a like reason, has suggested the name *Exophthalmus anæmicus* as suitable for the disease, while Taylor has called it *Anæmic protrusion of the eyeballs.* The English *Exophthalmic goitre* or the French *Goître exophthalmique* is a misnomer, as the thyroid swelling is, in many respects, quite unlike that of simple bronchocele. The most comprehensive term yet proposed is that of Lebert—*Tachycardia strumosa exophthalmica;* but as yet no definite or concise name has been suggested which is in itself at all explanatory of the pathological condition.

It was in the early part of the present century that the phenomena began to be carefully studied as factors of a single disease. Whether, or not, Basedow was the first to recognize the connection existing between its three essential features, by the thoroughness of his investigations and the judicious deductions drawn from them, he added largely to our knowledge concerning it; while Graves, with equally guarded care and accuracy of observation, noted diagnostic characteristics upon which the surgeon of to-day may place his fullest reliance. The celebrated von Græfe studied the disease, and with his remarkable insight detected elements which had been unnoticed before. The experiments of Claude Bernard helped to place it upon a neurotic basis; and since then many facts have been aggregated concerning the disease from a large number of cases carefully investigated in almost every country, including among the observers Charcot and Trousseau in France, Cheadle and Handfield Jones in England, Becker and Eulenberg in Germany, and numerous others in Austria and America.

Ætiology.—Unlike simple bronchocele, exophthalmic goitre is peculiarly prevalent in no special section of country. Eulenberg* is of the opinion that climate may exert an influence, and thinks that the literature would indicate a greater frequency of the disease in England than elsewhere; he quotes Lebert in the statement that it is more common in North Germany than in Switzerland or France. Mooren, in Düsseldorf, in nine years saw thirty thousand patients suffering from various diseases of the eye, and of these but thirteen had exophthalmic goitre.†

In the Alpine valleys, in which struma is so common, Basedow's disease is unknown. The time of development of the diseases is also different, uncomplicated bronchocele frequently appearing at an earlier age than exophthalmic goitre. The latter is essentially a disease of middle life. It is very rarely found in those under twenty—nor yet in old age. Exceptionally, however, the disease has been found in children, the youngest reported being that of Deval—as a sequel of scarlet fever in a girl only two and a half years old. In isolated instances the disease has occurred in old people, as in one case described by Stokes in a woman of sixty, and another by Trousseau also in a woman who was sixty-six years old.‡

As in simple bronchocele, the disease occurs far more frequently in women than in men. Eulenberg § gives the proportion as 2 to 1; von Græfe as 6 to 1; while in the 13 cases of Mooren's, above mentioned, but one was in a man. Chvostek, on the other hand, according to Sattler, while serving as surgeon to an Austrian regiment, found the disease much more often in men than in women. His experience was unique, however, and opposed to that of all other observers of extended opportunities. Græfe had found that men in whom the disease occurred were attacked much later in life and with far greater severity than were women. Indeed, in advanced age, in either sex, the disease occurs in its most serious form.

A special constitutional predisposition has certainly not been proven. Anæmic girls or women are more commonly among those afflicted, but others, having an abundance of red corpuscles, are also victims of the disease. In its advanced stages, when the circulatory system has become seriously involved, anæmia is almost always present, but rather as a co-existent or consecutive condition than as a primary cause.

Heredity may exert an influence on the predisposition of the child, but instances in which the disease has appeared in both mother and child are almost unknown. The case reported by Solbrig is frequently quoted of Basedow's disease occurring in an eight-year-old child whose mother also had exophthalmic goitre. A writer in the *Medical Record** narrates the case of a parturient woman suffering from Basedow's disease whose labor was abnormally protracted and difficult. When the child was born, an enormous bronchocele was found to have impeded the delivery.

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* Ziemssen, Cyclopædia of the Practice of Medicine.

† Græfe und Saemisch, Handbuch der gesammten Augenheilkunde.

‡ Reynolds's System of Medicine.

§ Ziemssen, Cyclopædia of the Practice of Medicine.

Among the exciting causes of the disease, intense nervous excitement or violent mental emotions seem to have been the most constant factor. A very remarkable case was that of Trousseau, given in full in his Clinical Lectures and quoted by Dr. Leonard.† The patient, a woman 62 years of age, was plunged in grief at the loss of her husband. One night, when greatly exhausted from watching and weeping, she was suddenly conscious of a protrusion of the eyes, so great as to prevent a complete closure of the lids. At the same instant she experienced a strong palpitation of the heart, with an enlargement and throbbing in the front of her throat; almost simultaneously her nose began to bleed, and the hæmorrhage continued throughout the night. Four days later, when Trousseau was consulted, he found a well-marked and typical case of exophthalmic goitre. Violent sexual effort may develop the disease, as in Græfe's case in which a young man struggled for half an hour before satisfying his desires; when he had succeeded he was thoroughly exhausted. The following morning exophthalmus was already noticeable, and before a week the eyeballs protruded to a terrible extent.

Dr. Greenhow is of the opinion that nearly every case can be traced to mental shock. He cites a valuable case ‡ of a woman in whom the disease appeared after the sudden loss of her three children; and in another from hyperlactation.

Dr. Gibson, in a clinical lecture,§ considers that the disease may be caused by violent straining, as in the act of parturition; and that hysteria is by no means an unfrequent preliminary or concomitant condition. Various acute or prostrating diseases have sufficed to excite Basedow's disease. Excessive hæmorrhages, the suppression of customary discharges, and injuries about the occiput have all proved developing causes.

Sattler || has noted in many cases in women that menstrual irregularities, especially amenorrhœa, precede the usual phenomena of exophthalmic goitre, while other observers are agreed that uterine derangements may aid in its development in those predisposed.

Pregnancy in some instances seems to have exerted a favorable influence. An intimate connection is found to exist between epilepsy and exophthalmic goitre, the former occasionally preceding the latter

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* Medical Record, October 6th, 1883.

† Lancet, December 1st, 1877.

‡ Am. Journ Med. Sciences, October, 1876.

§ Lancet, December, 1879.

|| Græfe und Saemisch, Handbuch der gesammten Augenheilkunde.

by several years. Various degrees of mental alienation are not uncommon, varying in degree from an unnatural peevishness and irritability to actual mania, as in the case of Dr. Williams.*

Symptomatology.—Cases like those above referred to, in which the disease has been developed with great rapidity, are exceptionally rare, and occur usually in consequence of a profound nervous impression. In some instances a temporary swelling of the thyroid, with palpitation and exophthalmus, may appear and soon pass away again. This is also quite unusual.

The ordinary course of Basedow's disease is slowly progressive, extending over a period of years if recovery ensue, frequently continuing through life. The disease is not essentially a fatal one, but unless relieved, other complications arise which usually greatly shorten the life of the sufferer.

The first manifestations of the disease are generally occasional attacks of palpitation of the heart, with increased frequency of the pulse. Gradually the intervals between the attacks grow shorter, the palpitations are more easily excited, and are of greater intensity. The heart-beats become continuously forcible, and a uniformly rapid rate is attained with no periods of relative quiet. The pulse in this condition is rarely less than 100. Eulenberg † cites a case of his own in which the almost invariable rate was 144, and quotes one of M'Donnell of 200 beats a minute, and still another by Gildemeester in which it was too rapid to be counted. This increased cardiac excitement seems, in the beginning at least, to be wholly functional. Physical examination reveals nothing abnormal. Only in the advanced stages of the disease, as might be expected, the ventricles, from over-exertion, become hypertrophied and dilated. The heart's contractions grow irregular, and the palpitation is increased by the least physical exertion or mental excitement. So forcible are the heart-throbs in some instances that they may be plainly heard at a distance from the sufferer. In a case of Græfe's they were so variable and unequal that some of the fainter contractions were not shown at the wrist at all, the pulsations of the heart exceeding those of the wrist by 6 or 8 beats per minute. A systolic murmur may sometimes be discovered over the apex of the heart, occasionally over the aorta and carotids. Preëxisting organic lesions may, of course, greatly modify these conditions. Usually, the distal pulse is weakened, but occasionally the same nervous energy is communicated to remote arteries, and a firm elastic pulse may be found in even the smaller arterial twigs.

Coincident with the heart phenomena, enlargement of the carotids with marked pulsation is usually present. Sattler,‡ indeed, considers this characteristic, and says that in well-defined cases it is never absent. So strong may this rhythmic throbbing become as to convey a thrill to the entire neck. The thyroid arteries are occasionally involved, and pulsation can often be detected when the hand is pressed upon the gland, even before the latter is perceptibly enlarged. Often, at a very early period, the smaller arteries of the head and neck manifest a swollen, tense condition, and they too throb with each forcible impulse of the excited heart. With the arterial tension is venous stagnation, and many observers have noted the full, swollen condition of the veins, especially the jugulars and thyroids. After the cardiac excitement has continued for a time varying from a few weeks to as many months, the second essential symptom, that of thyroid enlargement, becomes apparent. In those cases in which the disease has developed rapidly, the swelling may be simultaneous with the palpitation.* Exceptionally it may be a primary symptom. In very rare instances the thyroid may retain its normal size.† It never attains the enormous proportions which are occasionally found in simple bronchocele, although in several cases, notably those of Basedow, Prael and Roberts, the tumors were very large. The swelling is smooth, rather firm and elastic. Both lobes of the gland are usually enlarged, though often in different degrees.

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* Lancet, November, 1877.

† Ziemssen, Cyclop. of Pract. of Med.

‡ Græfe und Saemisch, Handb. d. ges. Augenheilkunde.

Occasionally, as in Mr. Yeo's ‡ case, the tumor is unilateral, and when this obtains, as Trousseau, Græfe, and others, have observed, the right is almost invariably, if not always, the lobe involved. In many cases the imperfect circulation is shown in the knotted veins and distended arteries which appear through the skin over the tumor. Frequently the beating of the larger arteries of the neck communicates a rhythmic impulse to the tumor in which a bruit may be detected on auscultation. The increase in size of the thyroid is gradual until a degree of hypertrophy is reached four or five times greater than the normal gland. In some cases the enlargement has been so great as to threaten suffocation, and demand the immediate performance of tracheotomy—as in a child under the care of Trousseau, and in a pregnant woman whose case was observed by Roberts. As Graves observed, however, the development of the tumor in exophthalmic goitre usually ceases at a period at which, in simple bronchocele, its growth is most rapid.

Occasionally, after remaining for many months but slightly enlarged, the struma rapidly increases in size. Palpitations or more forcible action of the heart may temporarily add to the size of the swelling. In women at each menstrual epoch it is also somewhat larger than usual. Enlarged and pulsating tumors have been observed by Stokes, and others, to become greatly reduced in size as the disease grew better, and to lose their pulsating character, leaving only a smooth hypertrophy of the gland due to increase in the connective tissue. Exceptionally, as Virchow has shown, colloid, and other, degenerative changes may take place in the tumor in very protracted cases of Basedow's disease.

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* Lancet, December 1st, 1877.

† Græfe und Saemisch, Handb. d. ges. Augenheilkunde.

‡ Lancet, March, 1877.

The exophthalmus is usually the third of the essential symptoms. Beigel* says that the ocular protrusion is never a primary symptom; but, though extremely rare, at least half a dozen well-authenticated cases are published in which proptosis preceded any evidence of disease either in the heart or thyroid gland.

The protrusion is usually bilateral and of like degree. In Yeo's phenomenal case,† already referred to, but one eye was protruded, and that on the side opposite to the hypertrophied thyroid lobe. Usually, if in the beginning one eye is pressed forward in the orbit, the other soon becomes likewise involved, although throughout the entire course of the disease one may continue more extensively protruded than its fellow. Exceptional cases have been reported, however, in which the exophthalmus has continued monocular. By pressure upon the protruded eyeballs they can, in the earlier stages of the disease, be forced back in the orbits; but on removing the hand, they return at once to their former position. The degree of protrusion is quite variable, occasionally being so great that the lids can no longer meet and the eyes are wide open, even when the sufferer sleeps. It is usually directly in the line of the orbital axis, except in those rare cases in which there is asymmetrical development of the orbital cushion.

Before the slightest exophthalmus can be discovered, a very important symptom of the lids should be noted. The patient will be found to have assumed a peculiar staring expression. The eyes are opened rather wider than usual, disclosing a narrow sclerotic rim, and giving to the face an expression of wonder, or sometimes of terror. This symptom, which Græfe with his extraordinary acuity was the first to observe, is uninfluenced by the degree of protrusion of the eyeballs, and is temporarily overcome by hypodermic injection of Morphia. It has been attributed by Græfe, and others, to sympathetic irritation exciting spastic contraction of the non-striated muscular fibres of the upper lid, discovered by Müller. Stellwag,‡ however, disputing this view, believes the trouble is dependent upon deficient innervation of the orbicularis muscle, and in this he is supported by Schweiger,§ who notes as analogous those cases in which is lost the associated movement of the upper lid, and in which voluntary closure of the lids is effected only with the greatest difficulty. So invariable was this symptom in the two hundred cases which Græfe studied, that he believed it pathognomonic, and a trustworthy indication in doubtful cases. Eulenberg, however, in one case with marked protrusion, found this symptom absent; and while he admits its great frequency, he doubts its value as a characteristic indication.

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* Reynolds's System of Medicine.

† Lancet, March, 1877.

‡ Stellwag, Diseases of the Eye.

§ Ziemssen, Cyclop. of Pract. of Med.

Another important symptom to which Stellwag was the first to call attention is the infrequency of the ordinary nictitating movements of the lids. The usual winking may be absent for several minutes at a time, and is replaced by a "weak screw-like motion at the edge of the lid."

Among the earlier ocular symptoms of which the patient complains is a sensation of dryness of the eyes, and a difficulty in using them for continuous close work. Visual acuity is not necessarily diminished. Usually, the ciliary muscle is not disturbed; but as the disease progresses, the range of accommodation is limited. The lachrymal secretion is increased, but on account of the widely opened lids and unfrequent winking movements, evaporation occurs quickly, and the eyes are abnormally dry. This gives rise to an irritant sensation on any attempt at close work, as in reading or sewing, in some instances amounting to actual conjuntivitis. In course of time the sensibility of the corneal nerves becomes blunted, and the touch of a feather or probe, while felt, no longer excites pain. When excessive protrusion is present, the corneal epithelium frequently becomes dull and turbid from exposure to the atmospheric air and dust; and in most serious cases considerable opacity may be found. In some cases the abnormal dryness is absent throughout the entire course of the disease, and when present is considered by Stellwag, like the deficient muscular movements, to be the effect of abnormal innervation.

In many cases ophthalmoscopic examination demonstrates no departure from the normal. In others, and especially those in which considerable disturbance of the circulation is present, a general hyperæmia of the fundus is found.

In not an inconsiderable proportion of cases spontaneous retinal pulsations may be detected. Otto Becker, who was the first to direct attention to this feature, found it wanting in but two of six cases that had come under his observation. In some instances the pulsation seems to be influenced by the intensity of the heart's action. In a majority of cases the pupil is unaltered. Several cases are recorded in which the pupil was widely distended; but as in the extended observations of Græfe, Eulenberg, and others, no case of persistent mydriasis has occurred, these were probably in the eyes of myopes, or the dilatation was dependent upon some extraneous cause.

The movements of the eyeballs are rarely limited. In high degrees of protrusion the lateral motions may not be as extensive as in the normal condition, but, as usually both eyes are involved, diplopia is rarely a consequence.

The upper lid sometimes becomes œdematous, and swollen veins may be seen through the skin. It occasionally occurs, though happily in very rare instances and those in which the disease manifests itself in its greatest intensity, that the nutrition of the cornea is seriously impaired, and destructive necrosis results. The cases in which this terrible complication is found are usually those in which the ocular protrusion has attained its maximum, so that the continued exposure of the cornea to the atmosphere, together with the unfrequent movements of the lids, allows a rapid evaporation of the lachrymal secretion with a consequent dryness. It is not alone to exposure, however, that corneal involvement is wholly attributed, as in occasional instances the eyeballs may be quite unprotected for a long time without the supervention of keratitis. In a remarkable case reported by Stokes both corneæ were entirely unprotected for more than a year without the least impairment of their integrity. In those cases also of paralysis of the orbicularis muscle in which the cornea is exposed, destructive keratitis is not a consequence. The necrosis in Basedow's disease is more probably due to an implication of the trophic nerve fibres, and the corneal necrosis is similar to that found in neuro-paralytic ophthalmia, and resulting from section or injury of the trifacial. The experiments of Meissner warrant this conclusion, which is the one with which von Græfe was in accord. The first evidence of an implication of the cornea is found in one or more small grayish-yellow spots of infiltration. These quickly grow purulent and increase in size, until, finally aggregating, the entire cornea participates in the suppurative process. In some instances this necrosis takes place with but little or no pain; in others the pain is agonizing. Occasionally, the iris and choroid participate in the trouble, and panophthalmitis, with all its pernicious effects, results.

As Græfe observed, men suffer much more frequently from corneal disease in exophthalmic goitre than do women; but even in most aggravated cases serious ophthalmic complications are very infrequent. In Græfe's 200 cases corneal suppuration occurred in but 14; of these 10 were men; while in the numerous cases of Basedow, reported by Stokes, Trousseau, and Mooren, this destructive process did not appear in one. Soelberg Wells* had seen but one case of corneal necrosis as a feature of this disease. In this instance the patient lost both of her eyes. Nettleship,† who had an opportunity of examining a staphyloma microscopically, from a patient whose eye was lost from this disease, found in its character no departures from the normal.

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* Soelberg Wells, Diseases of the Eye.

† Royal London Ophth. Hosp. Reports, vol. iv, 1873.

Treatment in these cases seems to have availed but little. Occasionally after perforation the wound heals spontaneously and the destruction ceases, leaving opportunity, if sufficient clear cornea be left, for a subsequent iridectomy. In one of De Wecker's * cases, that of a man in whom the protrusion was excessive, as a protection when necrosis threatened, the lids were stitched together over the protruded eyeballs, but the case became so aggravated that the wires cut their way out again within twenty-four hours.

In explanation of the corneal implication in Basedow's disease, various theories have been offered. That the exposure to external irritants is an important factor is more than probable; but that this is the only cause is unlikely, since, as Eulenberg † has observed, the same favorable condition is present in facial paralysis, involving the orbicularis muscle, with none of the untoward corneal implication. The view generally accepted is that of Sattler,‡ that the destructive keratitis is of neuro-paralytic origin, and is allied to that found in many prostrating diseases with the eyes wide open or only partially closed, as in typhus and low forms of typhoid fever or cholera, and is due to imperfect innervation of the vaso-motor or trophic fibres, entering the trigeminus from the sympatheticus. Together with the symptoms already detailed of exophthalmic goitre are others, which, while not constant, have been observed with sufficient frequency to invest them with not a little importance.

A degree of nervous irritability and irascibility not at all in accord with the usual condition have been frequently noted. In others, hysteria, and in others again, epilepsy, have preceded or accompanied the usual phenomena of the disease. In several instances actual mania has been an essential feature of the disease.§ In women, menstrual irregularities are of frequent occurrence, while anæmia and chlorosis are found in such a large proportion of the cases that several writers have assumed the disease to be primarily dependent upon the altered condition of the blood.

Diarrhœa occurs very often during the course of the disease; indeed, it is believed by Dr. Yeo ‖ to be a prominent symptom. Dr. Wilson Fox ¶ found this complication in two of the three cases which had come under his observation. Dyspnœa, with increased frequency of the respirations, may be found at any stage of the disease, but more frequently when the struma is greatly enlarged. This may be so serious as to threaten suffocation.

Among the indications of an involvement of the vaso-motor branches of the sympatheticus is a temporary erythema occurring in the face

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* De Wecker, Ocular Therapeutics.

† Ziemssen, Cyclopædia of the Practice of Medicine.

‡ Græfe und Saemisch, Handb. der ges. Augenheilkunde.

§ Lancet, Nov., 1877. ‖ Lancet, March, 1877. ¶ Lancet, Dec., 1879.

and neck or elsewhere on the body on the occasion of the slightest local irritation. The capillary engorgement almost immediately follows the irritation, and the part continues red for a minute or more. Trousseau, who was the first to direct attention to this symptom, called it the *Tache cérébrale*. In one case of Samelsohn's, in which the exophthalmus was unilateral, the flushing was confined to the side of the proptosis. Sattler observes, however, that this symptom is not peculiar to morbus Basedowii, but in exceptional instances is found in the normal physiological condition. It will be noted in this connection that the least mental excitement or physical exertion will quickly flush the face in the same way, and probably from the same condition of atony of the superficial capillaries. In one instance Dr. Noyes,* in a case of unilateral exophthalmus, saw firm tumors at the opening of the orbit; under the microscope they seemed to be composed of enlarged lymphatic gland-tissue. He also quotes an unusual case of Heyman's, in which paroxysmal attacks of conjunctivitis occurred with membranous exudation.

In Mr. Yeo's† phenomenal case in which, it will be remembered, the proptosis was unilateral and left-sided, profuse perspirations occurred on the affected side of the face, denuding the eyebrow of all of the hair and occasioning the loss of the lashes of the upper and the inner two-thirds of the lower lids. The hair was also lost from the right arm and axilla. Other instances are on record of profuse diaphoresis occurring during the progress of the disease. In a case to which Sattler refers the sweating was most profuse on the left side, although the ocular protrusion was bilateral.

In many instances the skin is rough and dry. Bulkley‡ has reported two cases in which urticaria was present as a complication. Persistent erythema and exanthema maculosa have also been found with Basedow's disease. In one case the skin assumed the color peculiar to Addison's disease, and this is of especial interest in conjunction with the fact that Dr. W. Rys Williams§ in one fatal case found both supra-renal capsules destroyed. Several cases of scleroderma have also been reported, but this complication is extremely rare. In a case of Leube's, that of a woman, the skin lay in smooth, thick folds, and gave the sensation on moving the hands of the skin being too short. In two cases gangrene of the hands supervened without apparent cause.

Those suffering from Basedow's disease frequently complain of a sensation of heat in the upper half of the body, and especially in the face and neck. Not unfrequently in this condition is found an actual elevation of temperature amounting to half or even one degree. In

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* Noyes, Diseases of the Eye.

† Lancet, March, 1877.

‡ Chicago Journal of Nervous and Mental Diseases, Oct., 1878.

§ Lancet, Nov., 1877.

Samelsohn's case, above mentioned, there was a barely perceptible increase of temperature in the affected side, the other being normal. Often, however, the sensation is subjective merely, the thermometer indicating no appreciable increase.

Gastric disturbances are of quite common occurrence; dyspepsia with waterbrash or vomiting, bulimia, or complete loss of appetite may be found at any period of the disease. Spasm of the œsophagus has been found in a few instances, in one of such extreme degree that even fluids could not be swallowed.

Occasionally, and more especially in the anæmic and chlorotic, there is great emaciation. This may be an early feature of the disease, or it may occur only after the disease has been for some time in progress. In one instance the wasting was more especially marked on the side of the larger thyroid tumor and the least protruded eye. Other diseases have occurred in exceptional cases as complications of exophthalmic goitre.

Mr. Wm. O'Niel* reports an instance in which the patient also suffered from diabetes mellitus. He noticed that the severity of the symptoms was in direct ratio to the varying size of the struma. Diabetes insipidus and albuminuria have also been present in diseases which Sattler is disposed to consider as not having an independent ætiological bearing, but with the primary symptoms dependent upon a central neurosis.

Course.—Basedow's disease, with rare exceptions, is a chronic affection which usually extends through a number of years. According to Mr. Holmes Coote † the disease is "rarely fatal, notwithstanding the apparent urgency of the symptoms." Heart flutterings, with occasional palpitations, especially on excitement or violent effort, may have been customary for months before alarming symptoms supervene. During this time too, the eyes may have the characteristic staring expression, with the widely dilated palpebral opening. An unwonted nervousness may also be noticed. The patient who is ordinarily of an even and placid disposition now starts at trifles and is easily annoyed. The stomach becomes deranged and the menstrual periods, if the sufferer is a woman, become irregular. All of these symptoms may disappear, only to return after a short interval with even greater intensity than before.

After these evidences of nervous disturbance have persisted for a longer or shorter period, varying from a few months to as many years, a sensation of fulness is noticed in the throat. On the event of unusual effort, or at the menstrual epoch, the thyroid gland is found to be swollen, and the neck-bands have become uncomfortably tight. This condition is soon a permanent one, and the hypertrophy of tissue is slowly progressive. In some cases soon after the goitrous swelling has appeared, in others many months later, the exophthalmus first becomes noticeable and then progresses more rapidly until marked proptosis is attained.

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* Lancet, March, 1878.

† Holmes, System of Surgery.

All of these conditions, however, as already shown, may vary in the time or order of their appearance, in the degree attained, and in the rapidity of their development. In exceptional cases one or the other of the principal phenomena may develop with great rapidity; and so in like manner a few cases are reported in which the palpitations and bronchocele gradually disappeared, leaving the exophthalmus alone prominent.

The greater proportion of cases continue with increased severity until some complication induced by the disease produces a fatal result. In exceptional instances the disease runs an acute course, reaching in a few days or weeks a high degree of intensity, and then as rapidly disappearing. After many months have elapsed, in the happy event of recovery, it will usually be found that the overtaxed heart has attained a greater or less degree of hypertrophy and dilatation, while the long-continued hyperæmia will have developed neoplastic elements in sufficient degree to leave some thyroid enlargement and exophthalmus.

As the condition improves, the symptoms disappear in the order of their development, the heart first growing quieter and the pulsations less forcible. Then the thyroid tumor grows smaller, and finally the eyes return to their normal position in the orbits.

When death occurs, in uncomplicated Basedow's disease, it is usually from exhaustion. General dropsy may be present from failure of the heart.

In a few instances death has been due to gangrene of the extremities which had appeared without apparent cause.

Pathology.—The opportunities have been so unfrequent for making post-mortem examinations of those dying with Basedow's disease, that our data as to pathological changes are as yet exceedingly meagre; and, indeed, in these cases the results have been neither striking nor characteristic.

Generally the heart has been found enlarged, the ventricles occasionally dilated, with, usually, hypertrophy of the walls. Valvular insufficiency has not usually obtained, in the few instances reported, as a feature of preëxisting endocardial or myocardial inflammation. Fatty degeneration has exceptionally been found in a measure as an accidental complication and, to a certain degree, as consecutive to other morbid conditions.

The larger arteries have in some cases been atheromatous, while the veins of the head and neck have usually been extensively dilated.

The thyroid tumor is usually found with the bloodvessels greatly enlarged. In one case after death the enlarged gland was found to have resumed its normal size, and in another it had become greatly diminished. The connective tissue is usually largely developed. In exceptional instances the same degenerative changes have been discovered as those occasionally found in bronchocele, and the normal glandular elements are replaced by cystoid, fibroid, or colloid structures.

In the orbit venous dilatation is an almost constant feature. Usually there is also an increased fatty deposit. In some instances, with the struma, the exophthalmus has been greatly lessened, or exceptionally has completely disappeared, leaving the eyes in a normal position in the orbits.

In several cases marked intestinal changes have been observed. In a case exhibited by Mr. Howes * before the Pathological Society, there was evidence of general catarrhal inflammation with pigmentation of Peyer's patches, apparently from ecchymosis. There was no reason to attribute this condition to typhoid changes. The same condition was also found in Mr. Williams's case.†

In some instances an examination of the sympatheticus, either macroscopically or with the microscope, has demonstrated no changes. In other cases various changes have been found in the cervical ganglia, such as enlargement and interstitial thickening, and, as Eulenberg ‡ observes, it is the lower ganglia that are chiefly or exclusively involved. Rarely, if at all, are any pathological changes found in the ganglia of the middle or upper cervical sympatheticus.

Examinations of the brain have given very negative results. In one case the larger veins of the pia mater were found abnormally distended, while the white matter of the brain was found, especially in spots, unduly vascular; at the spheno-occipital region was a small gelatinous enchondrosis.

In another case numerous soft spots were found scattered through the white matter, while in still another the dura mater was firmly adherent to the skull. But no facts of sufficient constancy were observed to aid our understanding of the essential nature of the disease.

Pathogenesis.—Although various theories have been offered in explanation of the phenomena of exophthalmic goitre, writers are not yet agreed in locating the fundamental disturbance. As already noted, many of the earlier observers were inclined to attribute all of the characteristic symptoms to leucocythæmia, as chlorosis and anæmia were so commonly present; but since more careful investigations have demonstrated that morphological blood-changes are by no means invariable in Basedow's disease, and rather, when present, consecutive or contingent upon other morbid conditions, the impression is now very general that the primary lesion must be looked for elsewhere, and that the impoverishment of the blood serves merely, by depressing the normal resistance, to permit its more ready development.

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* Lancet, April, 1877.

† Lancet, November, 1877.

‡ Ziemssen's Cyclop. of Pract. of Med.

Some writers again have attributed the various symptoms to paresis of the sympatheticus from pressure of the thyroid tumor. That this cannot be the essential cause is evinced in the fact that usually the struma is a later development, or even, in exceptional instances, absent, while the other cardinal symptoms may be present in their most severe forms. In simple bronchocele, moreover, the pressure may be so great as to cause death from suffocation without any of the other phenomena of Basedow's disease appearing. As Eulenberg has observed, a theory, to be satisfactory, must account for all of the cardinal symptoms of the disease; and this, it would appear, can only be done by placing exophthalmic goitre among the neuroses, the position to which writers are nearly unanimous to-day in assigning it.

Here, however, divisions have again occurred in locating the neural disturbance, one class ascribing the phenomena to irritation, the other to paresis of the vaso-motor filaments. To both of these views serious objections may be raised; while an irritation of the cervical sympatheticus would increase the frequency of the heart-beats, it would stimulate the vaso-motor fibres, causing capillary contraction and preventing the hyperæmic condition which actually obtains in the struma and proptosis. The paresis, on the other hand, which would allow the latter phenomena to obtain would tend to diminish the cardiac excitement.

Again, an attempt has been made to explain the symptoms by locating the disease in two centres, one of which is in a state of irritation, while the other is depressed, a condition which, if possible, is by no means probable.

The most reasonable explanation yet offered, however, is that of Rosenthal* on the basis of Glotz's experiments. These, in opposition to the teachings of Claude Bernard, have shown that elevation of temperature and increased vascularity are not necessarily dependent upon vaso-motor paralysis, but may be due to an irritation communicated to the vaso-dilator fibres, the existence of which Glotz's many experiments have made more than probable. These fibres, Glotz says, originate in the cord, and may receive an irritation through the reflex action of the spinal nerves. But the fundamental neural or cerebral disturbance has not yet been reached. Dr. Hammond,† reasoning more upon a semeiological than a pathological basis, locates the original disease in the medulla and brain, and there are numerous conditions warranting this view. First among these are the involvement of the par vagus, the various cerebral complications, and the fact that diabetes has also in occasional instances been one of the features.

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* Rosenthal, Diseases of the Nervous System.

† Diseases of the Nervous System.

Other facts might be adduced in support of this theory; but the limits of this article forbid its further elaboration. Suffice it to say that the consensus of advanced medical opinion is leaning toward a central neural origin in exophthalmic goitre, and no explanation so fully and satisfactorily accounts for the manifold disturbances as that which locates the disease at the base of the brain.

Treatment.—It will be evident from the conditions usually connected with Basedow's disease and the history of its development that one of the primary requisites in its treatment will be the establishment of as complete sanitary and hygienic conditions as possible. Those who have been living in damp and badly-ventilated apartments, with poor or improperly chosen food, must have fresh air and sunshine, while the diet should be most nutritious and digestible. Stimulants of any kind are usually harmful—and tobacco, by increasing the heart's action, is decidedly pernicious. Dr. Cheadle * recommends continuous rest, with the view of tranquillizing the circulation, and in some instances this may be advisable; but while excessive muscular efforts are to be avoided, a moderate amount of regular exercise will generally prove beneficial.

It is important, too, that mental depression be not permitted. Cheerful company and suitable occupation are essentially valuable. Frequently, an entire change of scene and climate will be beneficial, and more especially if the surroundings have been such as to suggest sorrowful or distasteful memories.

The cold-water treatment is often a most valuable auxiliary. Indeed, in this, De Wecker † believes, our chiefest hopes must be centred. The plan which he adopts is that of the wet pack, continued for ten or fifteen minutes at a time. This is followed by kneading in a moist, warm sheet. After a short time the packing is followed by friction with a rough towel, and as the condition improves a dry sheet is used as a pack, cold water being sprinkled upon it. De Wecker deprecates the employment of the cold douche and immersion, although the fine cold spray will relieve the dyspnœa excited by pressure of the tumor.

The ordinary remedies upon which the old school of practice have usually depended for quieting the heart's action in morbus Basedowii have for the most part entirely failed. The remedy upon which the greatest reliance has been placed is *Iron* in some of its forms. This has usually been given with some other drug, so that its absolute value could not be determined. Eulenberg has seen the best results follow the use of *Iron* and *Quinine*, which, he says, have often been surprisingly successful, even though they fail in a large number of instances. De Wecker, whose use of remedies is usually exceedingly judicious, depends largely upon *Iron* and *Arsenic* given in very small doses and at considerable intervals. In three cases, reported by Biegel,* which were treated by him with *Iron* and *Digitalis* almost wholly, one recovered entirely, the others were greatly benefited, the goitre and exophthalmus disappearing in both, and the general health at the same time being much improved.

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* St. George's Hospital Reports, 1877, 1878.

† De Wecker, Ocular Therapeutics.

Dr. Smith † speaks of two in which the exhibition of *Belladonna* was followed by most striking effects. Great relief followed in four or five days, although the disease had existed for over a year. Ringer ‡ mentions the fact that this remedy has long been employed in this disease by homœopathic practitioners.

Of the greatest value in a large proportion of cases is the *constant galvanic current.* Dr. Butler § points out its frequent homœopathicity to the disease, and in its pathogenesis, which he gives, it will be obvious that the symptoms of the remedy and the disease are very closely allied. The special indications will be omitted here, as they are all easily accessible.

Dr. Hammond || places so much reliance upon *galvanism* in Basedow's disease that, since the marked and rapid benefit which followed its application in two cases in 1865, he has never treated the condition without its employment. Dr. Bartholow ¶ reports three cases successfully treated by the galvanic current. These cases are all synopsized by Dr. Butler in his admirable work on Electro-Therapeutics and Electro-Surgery. In the treatment the negative pole was placed upon the epigastrium, and the positive so as to include the cervical sympathetic, the pneumogastric, and the cilio-spinal region within the circuit.

The result of properly chosen homœopathic remedies has been most gratifying. Among these *Belladonna* is of primary importance. Dr. Kidd ** reports a case in which it has been curative, and in the hands of others it has been of great value. *Arsenicum* will also be frequently called for, and more especially in those cases in which anæmia and emaciation are features. Dr. T. F. Allen †† is said to have cured one case with it. The special indications were not given. Dr. Lilienthal considers *Lycopus virginicus* among the most prominent remedies. Dr. Hale also credits the drug with having cured some of the most important symptoms of Basedow's disease. In a case reported in the *North American Journal of Homœopathy* the eyes lost their protrusion, the cyanosis decreased, and the features assumed a more natural expression under the influence of Lycopus. The struma and dyspnœa were not relieved, however, until *Iodine* 3^x was exhibited, by which drug

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[*] Reynolds's System of Medicine.

[†] Lancet, No. 26, p. 884.

[‡] Ringer, Handbook of Therapeutics.

[§] Butler, Electro-Therapeutics and Electro-Surgery.

[||] Diseases of the Nervous System.

[¶] Chicago Journ. Ment. and Nerv. Diseases, vol. ii.

[**] British Journal of Homœopathy, vol. xxv.

[††] Trans. Am. Hom. Oph. and Otol. Society, 1882.

the cure was completed. Dr. Hughes[*] knows of no record of cures with Iodine, notwithstanding Dr. Wood's assertion that experience has demonstrated its value. Certainly its local use has often a pernicious effect. *Spongia* has also been of value in completing a cure of the struma after the other symptoms had been relieved by other means, as in the remarkable case reported by Dr. Hirsch.[†] In this, a lady of thirty, the struma was unilateral, and the exophthalmus marked, with a complication of bronchial and vesical catarrh. A peculiar feature was the presence of small worms in the urine, which were found to be the larvæ of the common meat fly (musca carnaria), the eggs of which he supposed to have reached the bladder by endosmosis. The general symptoms were relieved by *Calc. carb.*, third trit., but *Spongia* was required for the struma and exophthalmus.

Dr. Willebrandt[‡] reports two cases cured in a few months with large doses of *Secale cornutum*, while two cures of Basedow's disease are credited by a writer[§] in the *United States Medical and Surgical Journal* to *Natrum muriaticum*. *Amyl nitrite*, given by inhalation, may give great relief and is said, indeed, to have been curative.[||]

Among the other remedies that may be required are *Badiaga*, *Cactus*, *Chloroform*, *Digitalis*, *Ferrum*, *Gelsemium*, *Conium*, *Nux vomica*, *Phosphorus*, or *Veratrum viride*, depending in each instance, of course, upon the special indications.

F. BRONCHOCELE.

BY F. PARK LEWIS, M.D.

Bronchocele (from βρόγχος, the throat, and κήλη, a tumor) is the name frequently applied to an enlargement, usually hypertrophic or neoplastic, of the thyroid gland. It is a misleading term, however, as the bronchia are never directly involved. *Goitre*, a name first given in Switzerland to the tumor, is a term more commonly employed. This expression is probably a derivative of the *guttur* of the Romans. Because of the great prevalence of the disease in a certain section of England it is also known as *Derbyshire neck*. On the assumption that the disease is dependent upon a cachectic basis it is frequently called *Struma* or *Follicular struma*. The laity, ignoring pathology, know the disease as *Swelled neck*, which is equivalent to the equally inaccurate *Grosse gorge* or *Gros cou* of the French. The most definite term which has been applied to the disease is *Thyrocele*, or the less concise *Hypertrophy* of the *Thyroid gland*.

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[*] Hughes, Pharmacodynamics. [†] Hirschel's Zeitschr. für hom. Klinik, 1870.

[‡] Hirschel's Zeitschr für hom. Klinik, 1869.

[§] U. S. Medical and Surgical Journal, vol. iv., p. 256.

[||] Trans. Am. Hom. Oph. and Otol. Society, 1882.

It will be remembered that the thyroid is one of the ductless glands. It consists of two lobes, one lying on either side of the trachea, and joined at about their lower third by a narrow transverse portion called the isthmus. It embraces the trachea, the posterior margins extending nearly to the pharyngeal walls. The gland varies materially in weight, being proportionately larger in childhood. Each lobe in the adult is nearly two inches long, and from half to three-fourths of an inch wide. The muscular relations are chiefly of surgical interest. The gland is reddish-brown in color, and consists of numerous vesicles, each of which is inclosed in a capillary net-work. The whole is held together by areolar tissue. The thyroid is abundantly supplied with lymphatics. The arteries come from the external carotid by way of the superior thyroid, and from the subclavian from the inferior thyroid. When a middle thyroid exists, it usually originates at the aorta. As Dr. Gilchrist* very judiciously observes, this extreme vascularity favors hypernutrition and hypertrophy, a slight provoking cause being required in those constitutionally predisposed to develop the tumor. The cerebro-spinal nervous branches which have an important bearing in their relation to goitre are from the pneumogastric, while the sympathetic nervous supply comes from the inferior and middle cervical ganglia.

Simple thyroid enlargement is by no means uncommon. In many women and girls the gland undergoes a temporary increase in size at each menstrual period. There are, however, certain sections of country in which the conditions are favorable for the development of the disease in which true goitre is met with great frequency. In Derbyshire, England, large numbers of people are afflicted with these unsightly tumors, while in the sunless valleys of the Alps, the Apennines, and the Pyrenees, the disease finds its chiefest habitat. Andrew Crawford† says that in the valley of Maurienne, Larrey found almost all of the inhabitants burdened with goitres. In several of the smaller cantons in which the disease is endemic, bronchial tumors were esteemed cosmetic attractions, their beauty depending upon their size and the regularity of their formation. Large numbers of goitrous people are found in France, and more especially in the valley of the Rhone. Dr. Webster,‡ who has made many careful observations on the subject, estimates the number of people afflicted with struma in France at five hundred thousand. In one town, in nearly one-fourth of the inhabitants were these tumors developed in a greater or lesser degree. He notes the important fact that of those so afflicted the greater number lived in houses having a northern exposure and but little sunlight.

In America goitre is said to prevail largely in the Province of Quebec. It is found endemic in the mountainous and marshy districts of the United States, and is most common in the valleys at the foot of the highest mountains and in the vicinity of rivers, lakes, and the sea, where the soil is rich and sheltered. In limited districts of New York State the disease is of frequent occurrence. It is said that the Oneida Indians were often its victims, although in a less degree than are creoles and Europeans. To-day the most enormous tumors are found in the vicinity of the Mohawk river.

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* Gilchrist's Surgical Therapeutics.

† Cooper's Dictionary of Medicine.

‡ Holmes's System of Surgery.

Ætiology.—From a study of the conditions under which bronchocele seems most vigorously to thrive, and of the localities most favorable to its development, it would appear that defective sanitation is a most important ætiological factor, while a strumous diathesis is unquestionably an essential predisposing element.

It is in damp valleys, having but little sunshine, according to Humboldt, or in dense forests or humid regions with scant vegetation where winds are tempestuous or the air stagnant, that goitres are found endemic. While on the lowlands the disease may be common, on the adjoining hilltop it may be unknown. In the Swiss valleys in which the sanitary conditions are most unfavorable and in which the population is much isolated, intermarriages are of frequent occurrence. Here, with idiocy and physical degeneracy, goitre is an almost invariable feature. In one of the valleys in which thyroid tumors had been exceedingly prevalent an inundation occurred, carrying away in the flood both people and property. When the waters had subsided, it was found that the marshy and unproductive soil had been deeply covered by a rich and fertile loam. In consequence the atmosphere was rendered purer. The efforts in cultivating the land bettered the physical condition of the people; and with the more wholesome food which they were enabled to obtain, the disease was almost wholly eradicated from the valley.*

The fact that the disease is prevalent in many of the localities in which the water supply is largely impregnated with lime, has led to the belief that in this may be found an essential cause of goitre. But that this is not a primary source of the disease is evidenced in frequently verified observations that in other localities in which the water holds in solution none of the calcareous salts goitre is found; and conversely, in many limestone regions the disease is practically unknown. It is also true that continued abstinence from unboiled water in suspected localities does not suffice to cure the disease; nor does its continued use prevent the beneficial action of remedies. It is a wise precaution, however, to prohibit the use of water in which may be any ingredient that can be inimical to a physiological condition. That waters containing the fluorides—as those of Derbyshire and Gastein—may have a causative bearing in goitre seems rather more than probable. Maumené, who advocates this view, in an experiment upon a dog established a permanent thyroid tumor by a five months course of Fluoride of potassium. The use of snow-water has also been considered an element in the development of bronchocele; but while thyroid tumors are not common in some localities in which melted snow is in general use, in others, as Sumatra, in which snow is never seen, the disease is endemic.

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* Holmes's System of Surgery.

Bronchocele is much more frequently found in women than in men, the undue enlargement of the gland often beginning with the advent of puberty. In one hundred and sixty-four cases which occurred in a town in France, one hundred and forty-three were females. Among the cases of goitre in Piedmont, fully half of the tumors were in children under two years of age. In certain localities, according to Hartshorne,* many more males are affected than females, although in India the disease seems to be equally common in the sexes. Isolated instances of congenital bronchocele are reported,† but such are quite exceptional occurrences. Goitre is said to have been epidemic in the French army at one time after the men had been subjected for a protracted period to forced marches with insufficient food supply.

Bronchocele is usually slow in its development. With the hypertrophy, the connective tissue of the gland is increased and its texture becomes coarser, forming a firm, smooth swelling, imparting a spongy elastic sensation to the touch. It may vary in size from an almost imperceptible enlargement to that of a tumor of immense proportions; usually both lobes are involved, but often in unequal degree. The hypertrophy may be limited to a single lobe, and if so, this, in the greater number of instances, is on the right side. Exceptionally, the median lobe may alone be involved. A curious case is mentioned by Andrew Crawford ‡ in which the goitre was cylindrical and reached half-way to the thigh. The usual form, however, is that of a rounded and pendulous growth dependent upon the sternum. Occasionally the connective tissue contiguous to the tumor becomes involved, carrying the hypertrophied structure as far backward as the ears. The normal vesicles may become cysts, often no larger than a millet-seed, or may, by aggregating, form a single cyst, occupying the greater portion of the substance of the tumor. A degenerative process may ultimately occur in the hypertrophied gland, and the tumor, according to the predominant elements, may be follicular, fibrous, vascular, or even amyloid. Occasionally, the substance of the growth is found to have broken down in a pultaceous mass. In at least one case, a true sarcoma was found to constitute the tumor; but the original disease was doubtless malignant, as in another instance the true glandular elements were found, unchanged, the cancer-cells having wholly developed in the adjacent lymphatics and cellular structures.

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* Reynolds's System of Medicine.

† Medical Record, October 6th, 1883, and December 29th, 1883.

‡ Cyclopædia of the Practice of Medicine.

Diagnosis.—The diagnosis of goitre is usually by no means difficult. The chief indications are found in the location of the tumor, its painless character, its firm, elastic feel, and the absence of special symptoms, other than those which might be mechanically excited from pressure on the organs of the throat. If cysts have formed, they may usually be discovered by palpation, or, if necessary, by an exploratory puncture with an aspiratory needle. The diseases which simulate goitre, and for which the latter might be mistaken, are lymphadenoma, lipoma, and other tumors of the neck. When but a single lobe of the gland is enlarged, and this lies directly over the carotid, the pulsations may closely resemble those of an aneurism, with which it might easily be confounded.

Prognosis.—Fatal cases of simple goitre are exceedingly rare, and occur only when the size and position of the tumor is such as to cause suffocation from pressure. A remarkable case of the kind recently occurred in the practice of Dr. W. B. Gifford, of Attica, N. Y. The patient, a pale, spare woman, 52 years of age, and of a nervous temperament, first consulted the doctor on April 1st, 1883, for a slight enlargement of the thyroid gland. She had been troubled for a long time with a dry, hacking cough, and on several occasions had had complete aphonia which was relieved by medicines. Iodine in various potencies was prescribed for the tumor without effect. It was also applied externally.

By June the growth had increased to such an extent as to excite dyspnœa. The hypertrophy was almost wholly limited to the right lobe. The voice had meanwhile grown very feeble, with general physical exhaustion. Calcarea carb. and Spongia were given for three weeks, with no apparent result. The difficulty of breathing grew so great that she was unable to assume the recumbent position. In addition to the remedies an ointment of Biniodide of mercury was applied without benefit. Getting no relief, she then placed herself under the care of a physician in another town who employed electricity, the current not known. In two weeks she returned, when Dr. Gifford was hastily summoned; she was then in an alarming condition, almost completely cyanosed from the pressure of the tumor upon the trachea. Operative measures were advised but rejected. October 24th she died. The doctor writes that the last four days she was kept alive by inhalations of Amyl nit. The autopsy demonstrated a most extensive development of the tumor. To the left it extended back of the sterno-mastoid muscle, and upward to the mastoid process, dipping a little over the border. It reached downward behind the left clavicle and also back of the sternum. The trachea was pushed abruptly to the extreme right, the posterior surface being tightly adherent to the tumor. It was found impossible to remove the whole goitre because of its firm adhesions. The centre of the tumor had broken down, and a cavity was found containing about half an ounce of light-colored pus. A microscopic examination of the tumor, made by the writer at Dr. Gifford's request, developed an excess simply of the normal glandular elements and connective tissue, with no adventitious cells.

Cases of this kind, however, are fortunately of very exceptional occurrence. Under improved sanitary conditions and judicious treatment a large proportion of the cases are cured; and even in those in which all efforts are ineffectual in removing the tumor, it rarely occurs that serious results ensue.

Treatment necessarily extends over a more or less protracted period when degenerative changes have taken place, but frequently the most gratifying results from suitably selected remedies are soon apparent.

Occasionally, indeed, bronchocele has disappeared without treatment. The goitres most amenable to remedies are those which have occurred during pregnancy. Cystic goitres, usually, are also quickly cured.

Treatment.—The sanitary conditions of the patient having bronchocele are of essential importance. If his home is cold and uncleanly, his food insufficient and of poor quality, and the atmosphere which he breathes vitiated, all of these must be first corrected. Cold hand-baths and an abundance of sunshine will tone and invigorate the system, and aid in the beneficial effects of any method of treatment that may be adopted. In those whose personal surroundings are all that could be wished, a change of residence, and preferably to a clear dry region, may be desirable. Dr. Guggenbühl found that by taking young cretin children from their valley home to an elevation in the Bernese Alps all were greatly benefited, and with the aid of medicines one-third of those thus treated were fully restored.*

For many years *Burnt sponge* was the remedy chiefly relied upon in the treatment of goitre. Dr. Coindet, of Geneva, believing that its value was dependent upon the *Iodine* which it contained, was led to test the efficiency of the latter drug alone, and so gratifying were the results that since then this remedy has been the one most commonly employed. It is used both locally and internally.

An application of *Biniodide of Mercury* has also been efficacious in the removal of goitres, and is very popular in India, where it was first employed. It is used as an ointment, three drachms of the drug in nine pounds of suet, being firmly rubbed in the tumor at daybreak, the throat of the patient then being exposed for several hours to the burning rays of the sun, when another application is made. This completes the treatment. Captain Cunningham, who originated the method, is said to have treated 60,000 of the natives in a single year without ever producing salivation and rarely failing in effecting a cure.†

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* Reynolds's System of Medicine.

† Quain's Dictionary of Medicine.

Hartshorne[*] is of the opinion that those cases originating sporadically and slowly developing are less easily influenced by Iodine than others in regions in which they occur endemically, and which grow rapidly, provided in the latter the sanitary conditions are improved.

The usual method of treatment of cystic goitre is by evacuation and injection. Perchloride of iron is the injecting fluid generally preferred, though Iodine has also been employed. Dr. Gilchrist[†] deprecates the use of the latter drug in this way, however, and believes that it is not devoid of danger, if not of life, at least to structural integrity of other glandular organs. He cites an instance of a young lady whose goitre was removed in this manner, and in whom atrophy of the mammæ subsequently occurred.

The homœopathicity of Iodine to bronchocele renders it a remedy of primary importance. Indeed, with this and Spongia, the most successful results have been obtained. While Dr. Gilchrist, with Jahr, finds few characteristic local symptoms, depending largely upon constitutional indications, he believes *Spongia* is especially useful in large bilateral tumors not sharply defined, of which condition he reports one cure with the 30th attenuation. *Iodine*, on the other hand, he deems more useful in "firm solid growths, occurring in individuals of a thin, dry habit, coarse skin, and coarse black hair."

Iodide of baryta has been recommended by Hale for bronchocele because of its beneficial effects on other enlarged glands.

In a tumor of the thyroid in which Schepens[‡] successfully used Iodine^{6} after Spongia^{30} had failed, however, the growth was large and soft, and of a rosy red color.

Calcarea carb. is often of great value in bronchocele. Dr. Hughes[§] refers to three cases of simple hypertrophy of the gland which were cured by Goullon with this remedy, and thinks, from its known value in other cystic growths, that in cystic goitre it might be beneficial. A popular form of administration seems to have been powdered egg-shell from which the lining membrane has been removed. Pröll[‖] reports a case in which the tumor had resisted other treatment for five years, a cure following the use of this form of Carbonate of lime.

A patient having the characteristic constitutional symptoms was cured by Dr. Erbstein[¶] with the third trituration of Calcarea carb.

Belladonna may be occasionally useful. Dr. Smedley[**] cured a firm aching thyroid swelling with this drug in two weeks, the general symptoms seeming to indicate it. The condition was one of hyperæmia in all probability, however, as a neoplasia could scarcely be relieved so quickly.

Silicea[††] and **Apis**[‡‡] are both credited with cures of cystic goitres. The Silico-fluoride of Calcium, or, according to Grauvogl, the Lapis alb., has been credited with excellent results in bronchocele. Dr. Bellows[§§] reports ten complicated cases cured or benefited materially by this salt.

Natrum mur.[‖‖] is said to have cured two cases in which the indications seemed favorable.

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[*] Reynolds's System of Medicine.

[†] Gilchrist, Surgical Therapeutics.

[‡] Revue hom. Belge, p. 143.

[§] Hughes's Pharmacodynamics.

[‖] Allg. hom. Zeitung, 1874.

[¶] Proceedings Hom. Med. Soc. Penn., 1873.

[**] Hahn. Monthly, vol. v.

[††] Allg. Hom. Zeitung, 1874.

[‡‡] Gilchrist, Surgical Therapeutics.

[§§] Am. Hom. Observer, 1869.

[‖‖] U. S. Med. and Surg. Journal, vol. iv.

Dr. Hale[*] speaks encouragingly of *Phytolacca*, and Gilchrist[†] reports its curative effects in one case in which the tumor was nodulated, and relief in another in which the condition was similar, with great weight in the part.

Dr. Butler[‡] has employed electrolysis in fibrous goitre with very gratifying results. In one case three operations were necessary, each of which was followed by the formation of an abscess which at the proper time was opened. In this way the entire tumor was radically removed. Lycopodium[†] and Salix nigra[§] are both said to have been successfully employed in the treatment of bronchocele, and might be of use when other remedies fail.

G. DIABETES MELLITUS.

BY CHARLES GATCHELL, M.D.

Derivation.—The first word is derived from the two Greek words διὰ and βαίνω, meaning *through* and *I flow;* the second word comes from μέλιττα, *a bee.*

Synonyms.—It is also known as Glycosuria and Mellituria. The French call it Diabète, and the Germans, Harnzuckerruhr.

Definition.—Diabetes mellitus is a formidable malady characterized by the following well-marked clinical features: excessive secretion of urine containing considerable quantities of grape-sugar, intense thirst, voracious appetite, progressive emaciation, accompanied by nervous, pulmonary, hepatic, pancreatic, or renal lesions, and usually reaching a fatal termination in from one to three years.

This, briefly, is the definition of true diabetes mellitus, which must be distinguished not only from the non-saccharine disease (Diabetes insipidus) but from those conditions accompanied by the presence of sugar in the urine (Glycosuria) which do not interfere materially with the general health or nutrition of the patient.

Historical.—1*st Century*, A.D.—In the early part of this century Celsus, the great Roman physician, made use of language which leads us to conclude that diabetes was known to him as a distinct pathological entity, and hence, in his *De Medicina* is to be found the earliest account of this disease in the world's literature.

2*d Century.*—Early in this century the Greek physician Aræteus, of Cappadocia, treated of the disease at some length, and was the first to give to it the name *Diabetes* (δια βαιειν), by which we still recognize it.

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[*] Hale's New Remedies.

[†] Gilchrist, Surgical Therapeutics.

[‡] Butler, Electro-Therapeutics and Electro-Surgery.

[§] Medical Investigator, April, 1875.

He considered the stomach to be primarily affected, and attributed the abundant urination to a transudation of the fluids of the system into the urine.

Galen, later in the century, taught that diabetes was a disease of the kidneys, and that these organs drew to themselves the liquid ingesta, and excreted them from the body unaltered.

The Middle Ages.—Throughout this long period the doctrines of Galen prevailed, with but little modification. Some physicians combined the two theories, but the first decided departure from Galen's views was made by Paraselsus, who taught that diabetes was a disease of the blood, which contained an excessive amount of the salt, and this, as a stimulant to the kidneys, excited them to increased activity.

1674.—In this year Thomas Willis, of London, discovered the presence of sugar in the diabetic urine, and thus revealed to the world the pathognomonic symptom of the disease. While the full import of Willis's discovery was not appreciated by the profession of his day, yet it gave a new impetus to the study of the disease.

1775.—Matthæus Dobson, of London, for the first time obtained the actual sugar in quantity from diabetic urine by evaporating its watery portion, and now the saccharine form of the disease was first clearly defined and distinguished from other conditions accompanied by abundant urination.

1797.—John Rollo first determined that the amount of sugar was increased by the ingestion of vegetable food, and lessened by an animal diet. Acting on his discovery, he first adopted the dietetic method of treatment, which prevails at the present day, of confining the patient strictly to the use of non-amylaceous food. The new field of inquiry which this opened led to a change in the views previously held touching the nature and seat of diabetes, and from the kidneys attention was again directed to the digestive sphere.

1835.—Ambrosiani, of Milan, added to the knowledge already possessed by demonstrating the presence of sugar in the blood, from the serum of which he obtained crystals of pure sugar and a large proportion of fermentable, crystallizable syrup.

1848–1857.—Claude Bernard, of Paris, in these years made his wonderful discoveries which laid the foundation of our present knowledge of diabetes. By a series of brilliant experiments he demonstrated that sugar can be made to appear in the urine by puncture of a certain spot of the medulla oblongata; that the liver is the chief, if not the only, sugar-producing organ in the body; that there is in the body an intermediate substance which he named *glycogen*, bearing some important relation to the process, besides many other facts having a direct bearing on the pathology of diabetes mellitus.

Ætiology.—There is no one thing which can be said to especially predispose to diabetes, since it occurs among all classes and under a great variety of conditions. We hear it more frequently mentioned to-day than in times past, but this is probably due not so much to its greater prevalence as to the greater accuracy which has been attained in its diagnosis.

Predisposing Causes.—Race.—There are no people who seem to be exempt from this disease, though, according to Seegen, it is more common amongst the Jews than amongst Christians. More extended observations would be required to establish this statement as a fact. Negroes are said to enjoy a comparative immunity from its attack.

Class.—Diabetes finds its victims among the well-to-do oftener than among the poor. This has not only been established by record, but no doubt agrees with the experience of the majority of practitioners in all countries. It also occurs in the lower animals, particularly in horses.

Heredity.—Since the awakening of interest in diabetes, and the collecting of statistics by so many inquirers, the fact was discovered that it is likely to appear in different members of the same family, either in fellow-children or in parents and children. Isenflaum observed the disease develop in eight children of the same parents as they reached the age of nine years. Senator has seen it appear in four children of a Polish Jew, and Marsh refers to a family in which diabetes could be traced through four generations.

Although the hereditary predisposition is not, ordinarily, as marked as in tuberculosis and nervous affections, yet it is an element which should by no means be ignored.

Another ætiological factor which must not be overlooked lies in the liability of this disease to appear in families afflicted with phthisis, epilepsy, and certain mental diseases, these cases showing the close connection between diabetes and derangements of the nervous system.

Sex.—The disproportion of cases occurring among the sexes is such as to establish conclusively the greater proneness of men than women to the disease. The records of 761 cases, collected by eight different investigators, show that 559 occurred among men and only 202 among women, in other words, that nearly three times as many men as women were affected.

Senator tries to show by statistics that females under the age of twenty are more prone to the disease than males of the same age, but Roberts has collected records of 906 cases which developed in persons under the age of twenty-five, and of this number 543 occurred in males and 363 in females, so that Senator's statement remains to be proved.

Age.—Although the disease may show itself at almost any age, there being recorded cases occurring as early as the first year, and as late as the seventy-first year, yet the majority develop in adults during middle life, that is, after the age of thirty.

An important fact concerning the prognosis may here be stated,

namely: the younger the subj
disease.

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Exciting Causes.—Ætiology is in some respects the most unsatisfactory part of the science of medicine. The mists of uncertainty which surround the cause of disease and bewilder the inquirer, the obstacles in the way of carefully studying the conditions which precede an outbreak, the small number of well-authenticated ætiological *facts* and the large number of vague *theories*, all tend to throw this branch of medicine into disrepute.

How often, when consulting the literature of different diseases, one meets the familiar and time-honored causes, exposure to cold, mental and bodily stress and distress, heredity, errors in diet, alcoholism, changes in climate, sexual excesses, syphilis, scrofula and, lately, the bacteria! One experiences a delicious sense of satisfaction, therefore, when he meets a landmark in this barren desert.

Traumatism.—Traumatism is such a landmark in the ætiology of diabetes, for it is the most common cause of the disease to which we can point with any degree of confidence.

It cannot be denied that the disease sometimes follows concussions of the brain and spinal cord, blows on the head or over the region of the liver and kidneys, and, probably, injuries which involve the vasomotor centres. Such injuries as these are often followed immediately, or in a few weeks, by the characteristic symptoms of diabetes mellitus. Many other injuries not mentioned in the above list have been followed by the disease, but however different the seat of the injury is, it is probable, as Roberts says, that some part of the sympathetic nervous system, either within the cranium or spinal cord, or in its peripheral distribution, is implicated. Some of these cases are severe, and rapidly reach a fatal termination, while others are mild, and disappear as the patient recovers from the results of the original injury.

M. Verneil has recently reported several cases of diabetes following attacks of malaria in surgical cases. The first case was that of a robust man, fifty years of age, who had an epithelioma on the penis. He had had malarial fever several years before, but recovered from it in due time. The epithelioma was removed, and on the second day after the operation malarial chills reappeared, which were controlled with Quinine. On the fifteenth day the patient complained of considerable thirst and a constant desire to urinate. His urine was examined and was found to contain a considerable quantity of sugar. The second case was one of epithelioma of the tongue, which was also removed by an operation. This patient, instead of having chills and fever, had diurnal recurrences, at the same hour, of pain and hæmorrhage from the wound. There being some urinary symptoms as well, the urine was examined and also found to contain sugar. Both cases improved, and eventually recovered.

M. Verneil, after a careful study of several such cases, finally came to the conclusion that malaria may cause one of two forms of diabetes, either a temporary glycosuria accompanying the fever, or a chronic form which develops some time after the fever subsides.

Organic and Functional Diseases of the Nervous System.—As injuries to the nervous system are responsible for many cases of diabetes, so organic lesions of this system are sometimes accountable for its appearance. Of these lesions, tumors of the brain and pia mater, cerebral softening, general paralysis and epilepsy are the most common precedents found in connection with the disease.

The lesions are usually in or near the medulla oblongata, or, when some distance away, they are always in a location which is either functionally related to the medulla or has some influence upon its circulation and nutrition.

Mental emotions appear to be the direct cause in some cases. Dr. Roberts mentions one case which followed the mental distress induced by an unjust accusation of theft.

Hysteria is sometimes accompanied by a mild and temporary glycosuria.

Those cases preceded by nervous troubles, traumatic, organic, or functional, are of special interest to the pathologist since the celebrated discoveries of Claude Bernard on the nervous control of the glycogenic function of the liver.

Exposure to Cold.—As has already been stated, exposure to cold has been considered the exciting cause of nearly every disease, and diabetes is no exception. Although it should be accepted *cum grano salis*, yet it should not be entirely rejected, for some cases are on record which have followed so directly and unmistakably exposures of this nature, as to leave no room for doubt.

Other less certain causes are severe bodily exertion, pregnancy, continued fevers, gout, errors in diet, too liberal indulgence in alcoholic liquors, and sexual excesses.

Pathology.—*Post-mortem Appearances.*—Diabetes is a disease without a pathology; that is to say, no constant morbid change has yet been discovered by the most careful post-mortem examinations or the most diligent microscopical researches. So far the essential lesion has eluded all investigators, for we must exclude the various theories which have been suggested as facts with more or less positiveness from time to time by various inquirers.

This is very evident when we examine the literature of this subject, and see the conflicting statements made in regard to the obvious pathological changes which occur in the different organs. One writer says the liver is usually enlarged and hyperæmic; another states that it is usually atrophied and pigmented or degenerated; one affirms that the pancreas is uniformly affected, another that it is uniformly normal; one author teaches that the lungs undergo tubercular degeneration in the majority of cases, while his opponent states that the pulmonic lesion so often seen is non-tubercular.

These contradictory statements reveal to us the sad state of uncertainty in which the subject now is, and we can only summarize from the weight of evidence which has accumulated. Yet, many of the apparently conflicting statements may be made to harmonize when we remember that the disease has different stages, and that each of these stages has a symptomatology of its own.

The records teach that diabetes is frequently accompanied by changes in the nervous system, the lungs, the liver, the pancreas, the kidneys, and the blood; it must be remembered, however, that there are sometimes absolutely no changes found in any of the organs, either with the naked eye or the microscope.

The Nervous System.—As has already been stated, the lesions occurring in the nervous system are of special interest to the pathologist with the knowledge gained by the physiological experiments of Bernard and others. These lesions, whether traumatic or organic, usually affect the medulla oblongata in some way. Frequently the lesion is a neoplasm or a blood-clot, pressing upon the medulla in the region of the fourth ventricle or the cerebellum. Other lesions of the brain which have been recorded are softenings, wasting of the gray matter, and degeneration of the bloodvessels.

Considerable discussion has been had over the last-mentioned change. Dr. Dickenson, of England, was the first to observe such a change, and he considered it the essential pathological lesion of diabetes. He describes it as, first, a dilatation of the bloodvessels, especially of the arteries; second, small extravasations of blood; third, dilatation of the peri-vascular spaces, alterations in the peri-vascular sheaths and nervous matter bounding the cavities. Of fifteen diabetic brains examined by him, he found extravasations of blood in seven, while the peri-vascular changes, thickening of the sheath, erosion or degeneration of the nervous matter, were invariably found; these were most marked around the largest vessels. The cavities were often sprinkled with blood-pigment. Several spots were found uniformly affected in all the cases; they were the olivary bodies, the vicinity of the median plane of the medulla, the gray matter of the floor of the fourth ventricle, and a particular spot just internal to the origin of the facial nerve. On this point there existed a remarkable sameness in all cases, a large excavation lying generally on both sides in connection with a process of the pia mater.

Others have observed this condition of the vessels, while many deny its existence, but no authority attaches as much importance to it as Dr. Dickenson. In his eagerness to discover a nervous origin for the disease he is, no doubt, inclined to not only exaggerate the importance of changes which may occur within the limits of health, but also to forget that certain appearances may be due alone to the methods of hardening and mounting the sections.

The Liver.—The liver, as might be expected, is affected in many cases. It is usually found hyperæmic, uniformly enlarged and hypertrophied. The enlargement may vary from a slight increase to three times the natural size of the organ. The hyperæmia is active rather than passive, and shows itself as a faint rosy tint diffused over the whole organ as well as the individual acini.

Upon closer scrutiny and microscopical examination the acini themselves are seen to be enlarged, and the component parts, the liver-cells around the periphery, are hypertrophied; their forms are also changed, being less angular and distinct, while the nuclei are marked, and upon the addition of a very weak solution of Iodine they assume a wine-red color.

Rindfleisch describes three zones in the acinus: the outer one, the region of the portal vein radicles undergoing the changes already mentioned, the intermediate zone, the region of the hepatic arterioles undergoing fatty degeneration, while the central zone, the region of the hepatic vein, remains unchanged. Beale and Pavy have paid considerable attention to the chemical changes which occur. The former considers a diminution of fat in the liver-cells a constant feature, and this supports the view taken by the latter that the glycogen is *normally* converted into fat, but that in diabetes this conversion does not take place.

Hypertrophic cirrhosis, that is, an increase of the connective tissue of the gland, has been observed by Trousseau and Dickenson. M. Le

Corche has also noted this change, which, he thinks, is due to the enormous amount of fluids which diabetics consume.

The apparently conflicting statements made in regard to the pathology of the liver are harmonized by the theory of Klebs that in the more chronic cases which reach the last stages of the disease a retrogressive change takes place which consists in a withering of the organ, caused by fatty degeneration and pigment atrophy of the cells.

The Kidneys.—The great activity of the kidneys would suggest some secondary, if not primary, changes in them, and such is found to be the case in the majority of instances. The changes are, however, those which can be accounted for by the increased functional activity, namely, active hyperæmia and overgrowth of the tubular epithelial cells, a similar condition to that found in catarrhal nephritis. The richly nourished epithelial cells become cloudy, and swell sufficiently to cause thickening of the cortical substance and, consequently, enlargement of the organ. If these cells become fatty, as they are apt to do in the later stages, the urine will contain albumen. Another change accompanied by the presence of albumen in the urine is amyloid degeneration, which may be due to the exhaustive drain of the original disease or of the phthisis which so often develops.

Senator thinks the irritating effect of the sugar and other abnormal constituents of the urine may excite a catarrhal inflammation of the pelvis of the kidney and of the ureter.

The Lungs.—It seems reasonable to expect that the organs which are active in the formation and elimination of sugar are changed in structure, but why profound changes should be so uniformly found in organs which, so far as our present knowledge goes, have little or nothing to do with the processes is not so comprehensible. Thus it is somewhat surprising to see that the lungs of diabetics are very liable to take on different forms of chronic inflammation; yet this is so common an occurrence that 90 of 157 cases had extensive pulmonary lesions (Griesinger, Seegen, Dickenson).

These changes consist mainly of ulceration and cheesy deposits resulting from circumscribed pneumonias, and resemble so closely the non-tubercular forms of phthisis that it was formerly taught that phthisis pulmonalis is a complication, and often the immediate cause of death, in diabetes.

That the cheesy masses are non-tubercular is shown by the fact that they never are the foci from which spring general tuberculous infection, and furthermore, although diligently sought for, the bacillus tuberculosis has never been found in them. Extensive pneumonia, pleuritic exudations, and gangrene of the lung are sometimes seen at the autopsy.

The Pancreas.—Professor Senator attaches considerable importance to lesions of the pancreas. Bouchardat was the first to point them out a few years ago, and since then they have been seen in nearly one-half the cases. Lancereaux claims that the form of diabetes associated with lesions of the pancreas can be diagnosticated by the sudden onset, the rapid course, the marked emaciation, and the peculiar alvine discharges. The changes are not constant, however. The gland may be simply atrophied or, in addition, degenerated. "Sometimes the degeneration consists merely in primary fatty destruction of the gland-cells, and sometimes it is induced by cancer, by the formation of calculi, and by obstruction of the efferent ducts, with cystic dilatation of the body of the gland" (Senator). Klebs thinks that "the disease starts from the pancreas, encroaches upon the cœliac plexus, and gives rise to diabetes by destroying its ganglia, or else the cœliac plexus is first affected, and, in consequence thereof, circulatory disturbances arise in the territory supplied by the cœliac artery, which lead to degeneration and atrophy of the pancreas" (Senator). Atrophy of the testicles has been occasionally observed.

The Blood.—Three forms of alteration have been noted in the blood. First and characteristically, the blood is surcharged with sugar. This has been repeatedly detected since the discovery of Ambrosiani, and the quantity in both arterial and venous blood estimated. Often there is a striking abundance of fat in the blood, which, on standing, forms a milky emulsion with the serum. Considerable fat can also be extracted by agitation with ether. Lastly, acetone has been found in the blood by Phillips. This later discovery is more important at present than ever before, on account of the theory, which is growing in favor, that the diabetic coma is due to acetonæmia.

Physiological Data.—We are indebted chiefly to Claude Bernard for our present knowledge of the physiological processes concerned in the production of sugar in the system. Between the years 1848 and 1857 he gave to the world the results of those brilliant experiments which established three important facts: First, the location of the process in the liver; second, the existence of an intermediate substance which is essential to the process; third, the localization of the nerve-centre which controls the process.

He was led to the first discovery while endeavoring to find the situation in the body where the sugar derived from the alimentary substance is destroyed. With this end in view he examined specimens of blood taken from the portal vein and from the hepatic vein of a dog previously fed on a rich saccharine diet. Sugar was found in both samples. Another dog, previously fed upon a meat diet, was subjected to the same experiment, when no sugar was found in the blood taken from the portal vein, but an appreciable quantity was found in that from the hepatic vein. The question immediately arose, whence came this sugar? There was but one answer possible, for it must have come from the liver. The next question to be decided was the cause of the formation of sugar in this gland. It was shown by Pavy that the liver during life does not contain sugar, as was at first supposed, but that, instead, it contains an amyloid substance which varies in amount at different times. Bernard extracted from the liver this substance to which he gave the name *glycogen;* he found that it closely resembles starch in composition, reaction, and particularly in the facility with which its transformation into sugar takes place. The action of saliva, of the pancreatic juice, and of diastase transforms it into sugar as it does starch; but the same effect, in the case of glycogen, is produced by the action of blood upon it, and herein it differs from starch.

Bernard performed the following instructive experiments: A liver was removed from a recently killed animal and left in a warm place for twenty-four hours. At the end of that time the vessels were irrigated with a stream of water. These washings were analyzed and found to contain a large proportion of sugar. When the sugar was all washed out of the organ it was again placed in a temperature equal to that of the body for another twenty-four hours. At the end of this time considerable sugar was again detected. This process was repeated for several days until finally no more sugar was formed and no glycogen could be extracted.

There are good grounds then for assuming that glycogen is constantly present in the healthy liver, where it is supposed to be stored in the liver-cells; that it is converted by a ferment in the blood, or liver, into a substance closely resembling glucose or grape-sugar; and in this more soluble form it appears in the blood leaving the liver, to be consumed in other parts of the system.

Two applications of these facts have been made to the pathology of diabetes; one, more generally accepted, was suggested by Bernard, the other by Pavy.

Bernard and his followers consider that diabetes consists essentially of the formation of more glycogen and sugar than the system can use; hence these substances pass through the systemic circulation and are eliminated by the kidneys.

Pavy and his school, on the other hand, think that glycogen normally is the intermediate stage between the starch and sugar absorbed from the alimentary canal and their conversion into fat, to serve in the formation of bile. In diabetes, they say, this conversion does not occur, but instead, the glycogen is converted into glucose, and as such appears in the blood and urine.

As has been stated, the amount of glycogen, and consequently of sugar, varies in health with different circumstances. This variation depends upon the state of digestion, the diet had, and the nervous influence at work.

Physiologists have found that it reaches its maximum about four hours after a meal, and gradually diminishes until the minimum is reached during fasting.

Highly saccharine or starchy foods have a marked influence upon the process. In fact, they may so augment the amount of sugar secreted as to impregnate the arterial blood with it and cause its appearance in the urine.

The most brilliant of Bernard's discoveries, and the one that has the most important bearing on the pathology of diabetes, was the localization of the nervous control of this process in the medulla oblongata. He demonstrated that puncture of a certain point in the floor of the fourth ventricle was followed by increased functional activity of the liver and the appearance of sugar in the urine. In other words, an artificial diabetes was produced.

This remarkable fact has been the centre of nearly all the theories in regard to the pathology of diabetes which have been advanced since its announcement; it has also been the starting-point of a large number of experiments made in the hope of ascertaining the true nature of the disease.

These experiments have demonstrated that injuries or lesions of the cerebro-spinal and sympathetic nervous system, in the most varied situations, were followed by the appearance of sugar in the urine. This symptom never occurred, however, during fasting, when the amount of glycogen in the liver is at the minimum, or when saccharine or starchy foods were withheld.

Inasmuch as the exact point in the fourth ventricle which controls the formation of sugar is near the origin of the pneumogastric nerves, Bernard was led to suppose that the exciting influence passes down their fibres, but further investigations proved that this was not true, but that the vagi were sensory rather than excitor nerves in this case. This was shown by galvanizing the proximal and distal ends of a severed vagus. In the former case glycosuria was the result, but in the latter no effect was produced.

The glycosuria following irritation of the proximal end was necessarily reflex, and shows, as has just been stated, that the function of the pneumogastric is sensory in this case, carrying the irritation to the nerve-centres, whence the impression reaches the liver through some other channel.

In connection with the irritation of the pneumogastrics followed by glycosuria, it is of interest to note the case, reported by Brunton, of diabetes caused by the presence of a tapeworm in the intestine, which was immediately cured on the removal of the parasite.

More extended search for the course of the glycogenic influence from the brain to the liver showed that in some cases it seems to take one path and in others another.

It usually starts from the vaso-motor centre in the floor of the fourth ventricle, thence it passes down the spinal cord to the exit of the hepatic vaso-motor nerves with the vertebral artery, it follows their fibres around the subclavian artery, and finally reaches the first dorsal ganglion of the sympathetic gangliated cord.

In some cases the influence does not leave the spinal cord with the vaso-motor filaments which accompany the vertebral artery, but it passes further down the cord, and finally leaves it with the communicating branch to the first dorsal ganglion.

It is seen that the two paths unite at this ganglion, whence the nervous influence reaches the liver through the gangliated cord of the sympathetic, the splanchnic nerves and the cœliac ganglion fibres passing from the latter to the hepatic vessels.

Tyson says: "It is evident that it is through the vaso-motor fibres of the sympathetic that the glycogenic influence is regulated, whence the oneness of the centre for the two regulations. The effect of section of these nerves is easily explained, since dilatation of the vessels and increased rapidity of the movement of the blood is the consequence. . . . . The effect of irritation upon the glycogenic function, whether propagated through the pneumogastric or some other sensory nerve, is nearly as simple. The effect of the irritation conveyed to the glycogenic centre is to inhibit the usual tonic influence of the vaso-motor nerves on the vessel-walls. The inhibition of this influence results in a dilatation of the vessels of the liver and a speeding of their contents. Thus, the same result is brought about in two different ways, the one direct and the other reflex."

Bernard is inclined to accept this view, for he thinks that the glycogenic influence acts upon the liver in the same way that the corda tympani nerve acts upon the submaxillary gland, namely, by causing active hyperæmia and increased functional activity. Furthermore, M. Lafont has performed an experiment which seems to put the matter beyond the reach of doubt. He isolated the spinal segment of a dog to which the first and second pairs of dorsal nerves were attached. He next exposed the liver, and then faradized the segment, when the liver was seen to become congested. A series of experiments in this direction led him to the conclusion that the glycosuria which results from stimulation of the central extremities of the pneumogastric in the dog, the depressor nerves, and the sensory nerves generally, is the result of an impression conveyed to the bulbar vaso-dilator centre by the way of the cervical cord, the first dorsal nerve roots, and the sympathetic and splanchnic nerves, and that it is irritative rather than paralytic.

It can scarcely be doubted that hyperæmia of the liver is a necessary feature of its increased functional activity, but it is evident that it must be more than a mere passive hyperæmia, otherwise diabetes would complicate those common cases of obstructive cardiac lesions.

Nerve irritation is not the only means at our command for inducing an artificial diabetes.

The so-called glycogen-producers, sugar, and other hydrocarbons, glycerin, etc., when taken into the portal vein, cause this condition. Luchsinger explains their action in this way: The active hyperæmia of the liver and the acceleration of the blood-current allow the glycogen-forming hepatic cells only a short contact with the blood, and hence they have not the opportunity to effect the change. In consequence, most of them pass through the liver, and that part which is changed into glycogen is reconverted into sugar. This form of glycosuria, due to actual increase in the amount of sugar introduced into the system, is called by Dickenson "normal alimentary glycosuria." "Abnormal alimentary glycosuria," the mild form of diabetes which disappears with a change of diet, he thinks is due to a lack of power in the liver to form glycogen out of sugar and starch. A third form, the severe cases of clinical diabetes, he thinks is due to increased formation of sugar independent of diet, on account of a defective functional action of the liver which forms sugar instead of glycogen from albuminous food. He considers this defective functional action due to circulatory disturbances, but offers no reasonable explanation of the conversion which must certainly be a complicated chemical process.

Pavy found that the injection of oxygenated blood into the portal vein produced glycosuria, and other experimenters have found that a host of substances injected into the circulation or inhaled into the lungs will sometimes cause the condition. Curare, Strychnia, Carbonic oxide, Amyl nitrite, Turpentine, Corrosive sublimate, and Nitrate of uranium are among them. Glycosuria is not invariably the result of their introduction into the system, however, and until more is known about their physiological action it will be difficult to account for their *modus operandi*.

Symptomatology and Clinical History.—Usually the onset of the disease is very gradual; so imperceptibly, in fact, does the patient pass from a state of health to one of sickness that he does not recognize the change until the disease has taken a firm hold upon him, and he then consults a physician for the first time in search of relief from the constant thirst and the annoying frequency of urination which are so characteristic of diabetes. If we could anticipate the onset of the disease and carefully study the condition of a patient in the earliest stage of diabetes, we would undoubtedly see many slight derangements of the general health, particularly of the digestive and the nervous tracts, with gradually increasing debility, not sufficiently marked, however, to cause great anxiety or apprehension of the formidable malady about to begin.

In a few cases the prodroma are pronounced and call for medical aid, but even then what is there in them to indicate the commencement of diabetes? Do not such symptoms precede many other diseases which bear no resemblance to the one under consideration? Is there anything pathognomonic about a period of digestive derangements in which the patient suffers from a depraved appetite, accompanied with more or less nausea and, perhaps, vomiting, or with frequent eructations and pyrosis, and an irregular action of the bowels, with a tendency to constipation? And is it uncommon for such a condition of the digestive apparatus to be accompanied by more or less marked nervous disorders, particularly headache with dizziness, sleeplessness and melancholia? Certainly not, and yet these are the only precursors of diabetes of which the patient complains.

If the disease results from an injury, a severe nervous or emotional shock, or as a complication of some other disease, the onset is apt to be sudden and preceded by no premonitory signs. Before the patient knows what ails him the two pathognomonic symptoms, the thirst and the frequent urination, are pronounced.

It is impossible to learn which of the two symptoms appears first; most patients notice the thirst first, because it is the most distressing and the most unnatural; but it would seem as if the dipsosis must be secondary to the loss of fluid by the excessive secretion of urine.

Sometimes the very first thing to attract the attention of the patient is a dryness of the fauces and a glutinous, viscid character of the saliva, but this soon gives place to an inordinate and insatiable thirst, which cannot be relieved even though the patient may drink incredible quantities of water. This symptom is very distressing, and its intensity is in proportion to the severity of the disease.

The oral secretions become acid, the gums grow spongy and retract, so that the teeth become loose and, in the advanced stages, drop out, absorption of the alveolar border following.

The constant urging to urinate harasses the patient by day and night, and makes life a burden to him. Every time he urinates the flow is copious, and if a drop falls upon his clothing a whitish stain remains, due to the presence of the grape-sugar. The urine grows paler and clear, and has a peculiar sweetish odor, very different from that of a healthy specimen.

The increase in the quantity of the urine passed first attracts the attention. It would be satisfactory if urinalyses could be made in a number of cases from their very incipiency, in order to learn whether, or not, the disease starts as simple polyuria. Some cases are on record of the transition from diabetes insipidus to diabetes mellitus, and Senator is of the opinion that many cases go through this metamorphosis. Of course, this can only be determined by a series of urinalyses made in the early stages of a large number of cases, and this is practically impossible because patients rarely seek the physician's assistance until the disease is well established. By this time the quantity of urine passed has become excessive and is proportional to the severity of the disease.

In mild cases, from seventy to one hundred ounces of urine are passed in twenty-four hours. It is not unusual to meet with cases that pass from five to eight quarts daily, and many instances are recorded of quantities far exceeding these. Bence Jones had under observation a man who passed seven gallons, and Peter Frank reported the case of a patient who voided fifty-two pounds daily. Other physicians have reported even larger amounts, but their cases are not well authenticated.

Occasionally a patient is seen in whom the quantity is not increased; such a condition is called *diabetes decipiens*, but it is only temporary and soon disappears.

The amount of urine voided by any one patient varies with certain conditions. It has already been shown that diet has a marked influence over the sugar formed; it also controls, to a certain extent, the quantity of urine secreted.

The amount of fluids ingested exerts a like influence. It has been asserted that the quantity passed exceeds that taken into the system, but carefully conducted observations show the reverse to be true, at least in most cases, a certain amount being eliminated by the lungs, the skin, and the bowels.

During the course of any intercurrent febrile affection the quantity of urine is diminished, as well as the amount of sugar excreted. In fact, the influence of most other diseases upon the behavior of diabetes is very pronounced. Nearly all of them diminish somewhat the saccharinity and the quantity of the urine, probably in consequence of the decrease in the amount of food taken and, also, by the increased elimination of water through other channels, as by diarrhœa, exudations, and increased cutaneous and pulmonary transpiration. The total amount of urine voided grows less also as the disease approaches a fatal termination.

As the urine increases in quantity it becomes paler, until, in some cases, it is perfectly colorless, resembling spring water, and is perfectly free from sediments.

A turbidity develops after standing a few hours in a warm place; this is due to the presence of fungi, the penicillium glaucum and the torula cerevisiæ.

The urine is unusually acid, not only when passed, but it retains its acidity for a long time because of the formation of an acid as the result of fermentation of the sugar.

The acid condition of the urine renders it rather irritating, so that in some cases the urethra becomes inflamed, especially about the meatus.

The specific gravity is abnormally high, and corresponds somewhat to the percentage of sugar in the urine; however, it is not wholly dependent upon this, for the amount of normal constituents has some influence upon it.

The highest recorded specific gravity is 1.074, which was observed by Bouchardat. The common rise is from 1.035 to 1.045. Exceptionally specimens are examined whose specific gravity is normal or even below the normal. The lowest on record is 1.005, observed by Beale.

The characteristic phenomenon, however, is the persistent presence of an appreciable quantity of grape-sugar in the urine. The amount excreted daily varies in different cases and at different times in the same case, but it is in direct proportion to the severity of the disease and to the quantity of urine voided. The three factors mentioned go hand in hand and are dependent upon the same conditions.

Sometimes, a mere trace of sugar is detected by ordinary chemical tests, but usually, if the case is at all advanced, the amount varies from one to ten per cent., which means from five to fifty grains to the fluid ounce. The maximum amount recorded passed by any patient in twenty-four hours was reported by Dickenson; a man under his observation voided fifty ounces a day.

The same conditions which influence the watery constituents have a corresponding effect upon the sugar passed. Thus diet and intercurrent febrile affections exert a marked influence upon the elimination. It has been observed that muscular exercise reduces the amount of sugar passed, a fact which has suggested that in health the sugar in the blood is destroyed by the vital action in the muscles rather than in the lungs, as was at one time very generally supposed. Occasionally the grape-sugar disappears temporarily and is replaced by inosite, or muscle-sugar. Vohl was the first to discover this substitution; he found it not only in a large percentage of the diabetics under his care, but in one rabbit that had been pithed by Bernard's method. Frey considers inosite one of the decomposition products of the histogenic elements of muscles.

The presence alone of sugar in the urine does not, however, constitute diabetes. Sir Lionel Beale says: "It is not uncommon to meet with specimens of urine from persons apparently in the enjoyment of good health which exhibit unmistakable evidence of the presence of diabetic sugar, there being sufficient to estimate quantitatively. I have often found from one to two grains of sugar in one thousand of urine in cases where all traces of the presence of this substance have disappeared in a few days, without any of the usual restrictions of diet."

Hence, a positive diagnosis of diabetes must not be made until there are conclusive data upon which to base it; it is wise, however, to be on the safe side, and to give every doubtful case of glycosuria the benefit of an anti-diabetic regimen.

Another abnormal constituent occasionally found is albumen. Its presence indicates a congestive catarrhal nephritis as a complication. That it does not mean a diffuse nephritis or a contracted kidney, in other words, Bright's disease, is proven by the post-mortem appearances of the organs, which are rarely found cirrhotic.

The pathological change in which this constituent occurs seems to be in the tubal epithelium, and is one of cloudy swelling which favors the transudation of the albumen from the serum of the blood into the urine. This condition of the kidneys, together with the weakened state of the bloodvessels from poor nutrition, causes, in the later stages of the disease, local œdema and anasarca.

The normal constituents of the urine are altered in diabetes. The most noticeable alteration is an increase in the amount of urea passed. From four to six hundred grains of this substance are excreted in twenty-four hours by a healthy man, but in diabetes, twice or thrice, and, in one instance mentioned by Senator, five times, the normal amount are passed.

Some observers have stated that the amount of urea is decreased, but this, while relatively true, absolutely speaking is untrue. The explanation is simple. The total amount passed in twenty-four hours is increased, but not in proportion to the relative increase in the amount of urine voided during the same time.

Conflicting views are held in regard to the origin of this large quantity of urea. There can be no doubt that a part of it is derived from the excessive amount of nitrogenous food which is eaten, but there are reasons for supposing that a portion of it is derived from other sources.

The increased amount of water which passes through the system tends to wash out the tissues and to hold in solution whatever excess of urea there is in them. It is assumed, also, that the albuminous materials of the blood split up into sugar and urea, thus furnishing a third source of supply.

Rev. S. Houghton, of England, made some experiments which proved that albumen, water, carbonic acid, and oxygen furnish elements for the production of urea and glucose in the proportion of one grain of the former to five of the latter.

It is supposed by some that this "splitting up" takes place in health, but that the sugar is oxidized for the production of heat, or used in the making of fat, while the urea is eliminated by the kidneys.

Prof. Clifford Mitchell considers the persistent presence of phosphoric acid in the urine one of the forerunners of diabetes. It is supposed to be derived from the disintegration of nervous tissue.

Petters was the first to discover acetone in diabetic urine. This, he found, was the cause of that peculiar odor which has been likened to wine, whey, apples, hay, and various other substances. He also detected it in the blood, and from this fact, and by experiments on animals, he was led to conclude that this substance was responsible for the sudden coma which occasionally develops, leading to a rapidly fatal termination.

Owing to the excessive elimination of fluid by the kidneys, the skin becomes dry, rough, and harsh. The patient rarely perspires, and yet does not complain of burning or heat. On the contrary, he feels cool, and if the temperature is taken it will be found below the normal, unless he is suffering from some intercurrent febrile affection.

The average temperature of diabetics ranges from 95.9° F. to 97.7° F., but occasionally it goes as low as 93° F. The temperature lowers as the disease advances, until, in the later stages, the lowest limit is reached. At this period the patient is greatly emaciated, there is little, if any, subcutaneous fat, and hence the heat of the body readily escapes. Foster determined by experiments the influence of cold drinks upon the temperature, and found that, other things being equal, they lower the temperature about 1° F.

Ordinarily, a diabetic does not perspire, except, perhaps, after a violent exertion, particularly, and in fact nearly always, when pulmonary complications are present. Unilateral sweating, from lesions of the sympathetic, has been observed. The perspiration also contains sugar.

In the later stages there has been observed a marked tendency to the formation of boils and carbuncles; this destructive tendency may be so strong as to cause extensive gangrene, which may appear spontaneously, but usually follows some trifling injury which would cause no trouble to a person in health. The gangrene is dry, and resembles the senile form.

Soon after the disease has become well established the appetite increases, sometimes to inappeasable hunger. In spite of the enormous quantities of food and drink consumed the patient loses flesh constantly, and eventually becomes much emaciated. During the progress of a chronic case this emaciation is so extreme that apparently nothing is left but the bones, covered loosely by integument. Advantage has been taken of this fact by some sufferers who have appeared before the curious multitudes of the country in the rôle of the "Living Skeleton."

Constantly increasing debility goes hand in hand with the emaciation, and the most trivial tasks become burdensome.

The large quantity of food taken overtaxes the digestive power of the stomach, and there results a varied train of dyspeptic symptoms, such as acid eructations, flatulence, and epigastric pains or sinking at the stomach; catarrh of the stomach and bowels occasionally supervenes, with constipation, finally displaced by a more or less severe diarrhœa.

The constipation is favored both by the elimination of fluid through the kidneys and also by the animal diet which diabetics generally take.

A peculiar odor of the breath is noticeable; it has been likened to that of stale beer, of a place in which apples are kept, and to various other odors. The fact is, odors cannot be easily described; the diabetic odor is characteristic and, once observed, is recognized without trouble. It is believed to depend upon the presence of acetone and alcohol, both of which have been detected in diabetics during life and are known to be the products of sugar fermentation.

There is no reason to doubt the correctness of this theory, for sugar has been repeatedly detected in the buccal secretions, and lactic acid is developed by the decomposition; the reaction becomes acid, and the dental caries and thrush which occasionally occur in the progress of diabetes undoubtedly depend upon the acidity in the mouth.

The nervous system is more or less involved in the general morbid state, and the moral nature of the patient is changed. Sleeplessness induces mental derangement and headache. A decrease of the sexual powers corresponds to the general exhaustion and functional insufficiency of the nervous apparatus. The patient is moody and melancholic, and the memory is very weak. Hyperæsthesia, neuralgic pains, morbid sensations of the skin, and muscular twitchings and weakness are not uncommon.

The sexual derangements usually consist in diminished functional activity and loss of sexual desire, with atrophy of the testicles. If the disease is arrested, and improvement occurs, the sexual apparatus returns to its normal condition. Now and then the opposite condition is seen, and the patient suffers from frequent erections and pollutions.

In women the sexual sphere is not disturbed.

The symptom which closes the course of the disease in the majority of cases is a profound coma from which the patient never rallies; more than one-half of the diabetic patients die in this comatose condition.

Dr. Ralfe, of London, who has given considerable attention to this subject, distinguishes two forms of diabetic coma, one, and by far the more rare of the two, has excited much discussion of late years.

The complication comes on suddenly without warning, perhaps after some unusual exertion, but at a time when the patient is in a tolerable condition and has no reason to fear immediate danger.

Suddenly there is great anxiety and sharp, epigastric pains, accompanied with vomiting, sometimes with traces of blood. After a short interval the patient becomes somnolent, tosses about restlessly, and generally groans loudly. The pulse grows very rapid and the breathing becomes labored, resembling that of an animal in which both vagi have been cut. This stage is short, and is followed by a noisy delirium which gives place suddenly to deep coma. The temperature and the pulse increase in rapidity as the coma deepens.

There are many symptoms associated with this condition resembling acute yellow atrophy of the liver and phosphorus poisoning.

Certainly, its characteristics point directly to some toxic agent in the blood, and the questions which demand solution are: what is this poison, and from what source is it developed? It cannot be uræmic, because the symptoms do not resemble uræmic poisoning, neither can uræmia supervene when such immense quantities of urea are excreted by the kidneys. Professor Saunders and D. J. Hamilton, of Edinburgh, think the coma is due to carbonic acid poisoning caused by fatty emboli in the pulmonary vessels, the result of lipæmia. This explanation is doubtful, however, for observers have failed to find emboli in cases of diabetics who have died comatose, and the existence of sufficiently extensive lipæmia has not yet been demonstrated. Others have suggested the presence of acetone as the responsible agent. Dr. Ralfe doubts the existence of free acetone in the blood, though there is no doubt of its presence in the urine. He thinks, however, that the blood contains some substance which readily yields acetone on decomposition, probably aceto-acetic acid.

Should this hypothesis prove correct, it will explain three unsettled questions: First, the cause of the highly acid condition of the urine so frequently associated with diabetes. Second, the lactescent condition of the blood commonly mistaken for free fat granules, since acetic acid will give a milky appearance when agitated with a dilute and slightly alkaline mixture of fatty matter at 100° F. Third, the intense fatty degeneration of the tissues so noticeable in cases of acute diabetic coma, for it is well known that the injection of acids into the blood of animals leads to increase of the fatty matters in the blood and to fatty infiltration of the tissues and organs. Aceto-acetic acid being one of the products of alcoholic fermentation, its presence could be explained without difficulty.

The other form of coma is the form which supervenes in the course of many chronic exhausting diseases, as phthisis. It is slower in making its appearance, and less profound and not so rapidly fatal.

A description of the essential and common features of an ordinary case of diabetes has now been given, but occasionally other symptoms are met which bear some relation to the pathological conditions induced by the disease.

Among these is the diabetic cataract which is found in about seven per cent. of all the cases. It develops rapidly and is nearly always symmetrical, involving both eyes simultaneously but not to the same degree.

Von Græfe thinks it is due to impaired nutrition caused by the presence of sugar in the blood.

Weir Mitchell and Dr. Richardson succeeded in producing artificial cataracts in frogs by injecting syrup into the blood, and they concluded that the greater density of the blood-plasma is the responsible factor. Others think that the cataract is caused by a partial desiccation of the lens.

Stellwag considers it dependent upon a weakened and impoverished condition of the blood. He says: "It is not the presence of sugar or the acidity which has been asserted to occur in the dioptric apparatus which chemically causes the destruction of the lens, but the great affection of the whole body which, like premature senility, shows itself also in the lens. The cataract, therefore, is only seen in high degrees of diabetes and in advanced stages when the body is much debilitated, and it often occurs when the production of sugar is much diminished.

"Cataract in diabetes has no anatomical peculiarities. It is usually soft and develops rapidly, as diabetes usually affects persons in youth or early life. If diabetes occurs in advanced age, the cataract dependent upon it is mixed with a large sclerosed nucleus.

"The proportionately greater frequency of its complication with amblyopia is peculiar, and it is to be remembered before commencing treatment.

"The amblyopia usually proceeds from an affection of the brain or of one of the nerve-trunks and, like cerebral amaurosis, is characterized by darkening of the visual field and symptoms of atrophy of the optic nerve-entrance, its bright, white color, greater opacity, decided contraction of the central vessels, etc."

Amaurosis, accompanied by an anæmic state, is sometimes developed in the later stages of diabetes. It is due to a paresis of accommodation.

Stellwag says: "It is generally bilateral and frequently preceded by disturbances in other nerves, so that they could only be regarded as one of the signs of extensive intra-cranial affections. The amaurosis was often announced by a gradual sinking of the relative acuity of vision throughout the whole extent of the visual field, generally with lateral deviation at first, sometimes varied in degree, or even receded completely. In other cases the disturbance of vision advanced very rapidly to complete loss of the perception of light, or appeared suddenly, remained several days or weeks at the same point, and gradually disappeared entirely, or left behind it considerable defects. As a rule, however, whatever the course taken, the signs of beginning atrophy of the optic nerves showed themselves within a short time, more frequently after certain signs of inflammatory proliferation had first appeared in the optic papilla and retina. Sometimes, it is true, there is a transient improvement of the visual power, but never a true cure; the atrophy rather appeared to be always progressive, even when subsequently the original affection had been removed, and the function of the other affected nerves had been brought up to the normal standard.

"It is unnecessary to mention that this amblyopia may occur in diabetic patients without cataract, and the disturbance of vision must, under all circumstances, be greater, as with the general affection of the nervous and muscular systems a true paresis or paralysis of the apparatus of accommodation usually accompanies high degrees of diabetes."

Dr. Albert G. Heyl, in 1880, described a condition of the fundus in a case of diabetic cataract which he called intra-ocular lipæmia. The condition was characterized by a light salmon color of the blood in the retinal vessels, very different from their colors in health. He considers the change in color due to the abnormal amount of molecular fat in the blood. Ophthalmoscopic examination of the case showed only two deviations from a healthy standard. First, the one already mentioned in which the color in both the arteries and veins was the same. Second, the apparent dilatation of the vessels to twice their natural size. He explains as follows the last peculiarity. Ordinarily only the axial stream of blood is visible, and hence the vessels appear smaller than they really are. If, by any means, the peripheral stream is rendered visible, then the vessels appear twice as large, but really at their natural size. Molecular fat has this effect of rendering the entire blood-current visible, and hence the apparent dilatation of the vessels. It must be remembered, however, that the microscope fails to reveal molecular fat in the blood.

Other derangements of the special senses occasionally occur, such as ringing in the ears, faulty hearing, perverted taste and smell.

Course, Duration, and Prognosis.—Diabetes is almost always a chronic affection which may consume many years in passing through its stages, but occasionally an acute case is seen (diabetes acutus, or acutissimus) which runs its course in a very short time.

Statistics have been collected by Griesinger and Dickenson showing the duration of 125 cases. The results are these:

2 cases died in less than 3 months.
4. " " between 3 and 6 months.
21 " " " 6 months and 1 year.
45 " " " 1 and 2 years.
25 " " " 2 " 3 "
8 " " " 3 " 4 "
2 " " " 4 " 5 "
1 " " " 5 " 6 "
2 " " " 6 " 7 "
1 " " " 7 " 8 "
14 " The time was not determined.

This table is made up from hospital cases, hence the durations here given are uncertain, the patients not having been under observation from the incipiency of the disease. Again, the class of patients who apply to hospitals are placed among unfavorable sanitary surroundings, and hence the disease, once established, makes more rapid ravages than among the more favorably situated classes.

A case of intermittent diabetes has been under the observation of Drs. Prout, Jones, and Dickenson for sixteen years. Lebert mentions a case which lasted eighteen years, the patient enjoying good health while on appropriate diet, but lapsing immediately on an indiscriminate diet.

With appropriate diet, an ordinary case of diabetes, especially if it is not far advanced, can be held in check for an indefinite period; the sugar will decrease, the quantity of urine will be diminished, the thirst will be less harassing, the nutrition will improve, and the patient may resume his ordinary duties without distress. Every violation of the laws of appropriate diet, however, is followed by a prompt return of threatening symptoms.

If we recognize two forms of diabetes, the mild and the severe, or two stages, the first and the second, the foregoing remarks apply to the mild form, or the first stage; in the severe cases the most rigid enforcement of dietary regimen and the most favorable circumstances will fail to arrest permanently, or for any great length of time, the progress of the disease.

The young are particularly liable to suffer from the severe form of the disease, and its severity seems to be in inverse proportion to the age of the patient. Hence it is that the most acute cases are seen in children who often die within a few days or a few weeks after the disease has declared itself. A very acute case is reported in the *New York Medical Record*, vol. xx., p. 710, which occurred in an adult whose weight in health was 240 pounds. This patient died after three weeks of sickness, and only 60 hours after a physician was called and the diagnosis made.

It may be safely stated that the prognosis in a case of idiopathic diabetes is always unfavorable. It is also to be remembered that in the discussion of the grave malady and of its termination reference is not made to those lighter cases of glycosuria which have been incidentally mentioned. In fact, it is absolutely necessary to carefully, and at all times, differentiate between idiopathic and purely symptomatic diabetes. The former includes cases arising in the young and strong, without any appreciable cause, independent of any preëxisting morbid state; the latter depends upon some disease-condition already existing, is practically a concomitant symptom of the chief lesion, and of itself does not lead to a fatal termination.

The diseases which most frequently give rise to glycosuria are the neuroses. Hysteria is complicated with transitory glycosuria which disappears with the hysterical symptoms. It also follows some epileptic attacks and delirium tremens. Chorea major, tetanus, insanity, and in fact nearly all of the neuroses have been known to excite symptomatic diabetes.

The many injuries and organic diseases of the nervous system which give rise to diabetes have been described in a preceding section, but they are more formidable than those just mentioned, because many of them end fatally by the progression of the original malady.

Pregnancy, in importance, stands next to the neuroses. Dr. J. Matthews Duncan has observed diabetes in 22 cases of pregnancy, and from his studies of these cases he has drawn the following conclusions:

Diabetes may come on during pregnancy. It may occur only during pregnancy, being absent at other times, or it may recur again at some future time.

Diabetes may make its appearance soon after parturition and disappear spontaneously. Dr. Duncan also makes the proposition that pregnancy may occur during diabetes and progress favorably to parturition, or its course may be interrupted by the death of the fœtus.

Others have seen permanent diabetes follow pregnancy.

A mild form of glycosuria sometimes appears in old and corpulent persons; it probably depends upon the vaso-motor changes which occur in advanced age, and it rarely interferes with the general health, nutrition, or activity of the patient. Charcot, speaking of this form, says: "The urine is only slightly increased in amount and the thirst may not be at all marked." It is usually of the intermittent type and destitute of well-marked symptoms.

Treatment.—Both schools of medicine agree that the treatment of idiopathic diabetes rests mainly upon the diet. This is clearly taught both by our physiological knowledge of glycosuria and by clinical experience.

The latter has proven that many cases are restored to a state of comparative health by proper diet alone, and that, on the other hand, the action of remedies, when not reinforced by an anti-diabetic diet, is almost powerless and practically unable to make any impression upon the progress of the disease.

Yet the two methods employed simultaneously will accomplish more than diet alone. Hence, the management of a given case resolves itself into dietetic and medicinal treatment.

Dietetic Treatment.—A knowledge of the physiological processes concerned in the production of sugar in the system leads directly to the cardinal principle in the dietetic treatment of a case of diabetes, namely, the exclusion of all sugar and sugar-forming foods; and the more perfectly we carry out this principle, the more gratifying will be our success. Sugar, however, is derived from so many substances that its formation in the system cannot be entirely avoided;

and even could this be accomplished, the patient's diet would be so limited in variety that he would not only suffer for the want of proper nourishment, but would soon rebel against such rigid treatment, preferring to die of the disease than of the miseries of starvation.

We are limited, then, to articles of food which are not easily converted into sugar and still insure to the patient a fairly varied and palatable diet. Sugars, of course, are forbidden, and likewise the hydrocarbons which are readily converted into sugar during digestion.

It is particularly trying for patients to give up potatoes and bread, articles which form so large a part of general diet. But since it is absolutely necessary to do so, much pains have been taken to provide some harmless substitutes. This is not so difficult in the case of potatoes, because other vegetables, less rich in starch, are relished by the patients; it is much more trying to provide something to take the place of bread and pastry.

Of the various substitutes for wheat, mention may be made of bread made of gluten flour, bran flour, and almonds.

Dr. Bouchardat, of France, first recommended gluten flour. He devised a method of freeing wheat flour of nearly all of its starch (80 per cent.), and using the remainder for bread, mush, porridge, etc. But in extracting the starch nearly all of the salts are taken as well, thus rendering the gluten bread unpalatable and insipid; it is furthermore almost impossible to make the gluten flour into dough. Chemists manufacture gluten bread and biscuits for the use of diabetics, and several of their preparations, as for instance those made by the Health Food Company, of New York, possess considerable value.

Liebig simply submitted slices of bread to the action of diastase. In this way the starch is converted into dextrine, which is soluble and easily removed by washing the slices in water, after which they were dried and toasted.

Prout recommended bran flour, but it is not held in high esteem. It is not only unpalatable, but it is hard to digest, and irritates the intestine. The latter property is not wholly objectionable in cases that are inclined to constipation. When mixed with milk and eggs, and then cooked, it is said to be greatly improved in taste.

Dr. Pavy, of London, introduced the use of almond flour. According to Seegen, the food may be prepared in the following manner: "Beat a quarter of a pound of blanched sweet almonds in a stone mortar for about three-quarters of an hour, as fine as possible; put the flour thus produced into a linen bag, which is then immersed for an hour and a quarter in boiling water, acidulated with a few drops of vinegar. The mass is then thoroughly mixed with three ounces of butter and two eggs, the yolks of three eggs and a little salt are added, and the whole is to be stirred briskly for a long time. A fine froth is to be made by beating the white of the three eggs, and added. The whole paste is now put into a form smeared with melted butter, and baked by a gentle fire."*

All of these substitutes for the common bread are more or less unsatisfactory, and patients soon grow tired of them. Fortunately for them, all animal foods and many vegetables agree with them, and at the same time have a beneficial influence upon the elimination of sugar.

It is needless to enumerate the many varieties of meat which patients may eat. None of them seem to increase the amount of sugar voided; in fact, all meats seem to decrease the amount, and hence the invalid may select those which best suit his taste. Fish, oysters, lobsters, etc., are allowable, as well as eggs and poultry.

In the selection of vegetable diet it is necessary to discriminate and to forbid the use of articles which, like the potato, are rich in starch or sugar. As a rule, the so-called greens are poor in these compounds, and hence constitute allowable articles of diet. Spinach, lettuce, celery, the green parts of cabbage, asparagus, cucumbers, young onions, etc., nuts and unsweetened preparations of gelatine, may be eaten judiciously. Milk, buttermilk, cream, and cheese are not forbidden, and tea and coffee, sour wines, and the mineral waters are admissible.

When patients object to tea and coffee without sugar, glycerine has been substituted, but most persons soon acquire the habit of drinking them clear.

Skim-milk has been used with success in the treatment of diabetes. Dr. Donkin first advocated an exclusive diet of skim-milk; he did so on the theory that sugar of milk is not harmful, as are the other sugars, cane or grape. Good results have been reported to follow a rigid adherence to this treatment, but several noted English physicians have attacked the method.

The following dietary will prove of service. Articles of food allowable:

Oysters and clams, prepared in any way, without flour or crackers.

All kinds of fish.

Meats of all kinds, *excepting liver.*

Game and poultry.

Animal broths, without thickening.

Eggs, without flour or sweets.

Vegetables, as green cabbage, cauliflower, green string-beans, asparagus, spinach, dandelion, mushrooms, lettuce, cucumbers, olives, celery-tops.

Bread, pancakes, mush, biscuits, etc., made of gluten, bran, or almond flour.

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* Tyson, Bright's Disease and Diabetes, p. 284.

Nuts, salt, vinegar, pepper, and cheese.

Coffee, tea, sour wines, and waters surcharged with carbonic acid, milk, and cream.

Articles to be avoided:

Liver.

Vegetables, as potatoes, rice, beets, carrots, turnips, peas, beans, etc.

All preparations containing wheat flour.

Malt liquors and sweet wines.

Medicinal Treatment.—The pathogenesis of many drugs corresponds more or less closely with the symptoms of diabetes, but, unfortunately, most of the provings do not state whether sugar was detected in the urine. This, the essential feature of diabetes, must be present in the pathogenesis of any remedy that is truly homœopathic.

Experimenters on animals have seen glycosuria follow the intravenous injection of several medicinal substances; among them are Curare, Strychnia, Amyl nitrite, Turpentine, Corrosive sublimate, and Nitrate of uranium. The last named has acquired quite a reputation in our school, and, perhaps, stands at the head of the list of therapeutic agents recommended for the treatment of diabetes.

URANIUM NITRATE.—In 1857, M. Lecomte stated that dogs poisoned with small doses of Uranium nitrate would void saccharine urine. This was a signal for its trial in the treatment of diabetes, and it was not many years before favorable reports of its use began to appear in the journals.

Dr. Bradford was the first to point out its efficacy, and in 1861 Dr. Hale reported three cases that were favorably influenced by the third trituration. As no urinalysis was made, however, in any of the cases, they cannot be of positive value.

Dr. Hughes, in 1866, reported three cases, and gave the results of the daily examination of the urine which showed the power of the remedy to reduce the quantity of sugar and urine in certain cases. He thinks that "it is best suited to cases originating in dyspepsia or assimilative derangement, while Phosphoric acid excels it where the starting-point of the disease was in the nervous system." *

He recommends the use of the first and second decimal attenuations. The following appear among the provings of the drug: Sugar is deposited in the urine. General languor; debility; cold feeling; vertigo; purulent discharges from the eyelids and nostrils, with ulceration of the cheeks from the acrid discharges; copious salivation; vomiting with great thirst; putrid eructations; urgent desire to evacuate bladder and rectum; frequent micturition; cough, with purulent discharge from nostril; lung infiltrated with gray tubercles; stiffness in loins; languor on rising from bed, with fishy smell of urine; prostration, somnolence, and shivering during the day; restless at night.

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* Manual of Therapeutics, vol. ii., p. 244.

PHOSPHORIC ACID.—Hughes, recommending this drug highly in the treatment of diabetes, says, "it stands, at present, unquestionably in the highest place among the remedies for diabetes."*

Three cases treated with the drug are cited. One was cured, and the others were relieved. Fourteen grains of the anhydrous Phosphoric acid were diluted in six ounces of water, and a dessert-spoonful taken three times a day.

"It is in diabetes," says Dr. Hughes, "that Phosphoric acid has won its greenest laurels. Not only in the *insipid* form—'chronic diuresis' as we should now call it—but in true glycosuria, a cure has repeatedly resulted from the administration of this acid. It is actually a *similar* to the essential symptom of the disease, for Dr. Pavy found saccharine urine to result from its introduction into the intestinal canal, and Griesinger, who gave it in diabetes to the extent of an ounce a day, found the sugar increased thereby. But the frequent origin of diabetes in the nervous centres (as suggested by Claude Bernard's well-known experiments) commends it still more forcibly; and in the only case in which I have myself needed it, to reinforce the Nitrate of uranium, the disease obviously began in this way. It will, therefore, be in diabetes of nervous origin that we shall expect to get the best results from Phosphoric acid. Moreover, since Claude Bernard found albuminuria to result from a central nervous lesion, hardly that which occasions diabetes, there may well be cases of this malady in which Phosphoric acid is indicated."

The indications for Phosphoric acid given by Lilienthal are: "Debility from loss of animal fluids; bad effects from grief, sorrow, anguish, and care; all the joints feel bruised; very sensitive to fresh air; lassitude and heaviness; weakness of mind; falling out of hair; dimness of eyes; excessive thirst; eructations from acids; pressure in stomach; hard, difficult stool; shortness of breath; urine thick, like milk or lime-water, with whitish curds, with stringy bloody lumps, or clear, limpid, and containing much sugar; pains in back and kidneys; dull pressure in bladder; great weakness and emaciation; furunculosis." Many other remedies cover the symptoms of diabetes; all have been used with more or less success, but none of them have proved reliable.

Arsenicum and Plumbum are certainly indicated in many cases.

Recently the Bromide of arsenic has been brought to the notice of physicians, and many favorable cases have been reported. It is given in solution, drop-doses of the Liquor arsen. brom., and also in the low triturations.

PLUMBUM is particularly indicated when the kidneys are overstrained and albuminuria exists as a complication.

Chronic lead-poisoning produces a perfect picture of Bright's disease and bears a close resemblance to diabetes.

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* Manual of Therapeutics, vol. ii., p. 241.

Arnica is indicated and recommended in those cases of glycosuria which result from injuries, such as blows over the liver, and so forth.

Belladonna and **Podophyllum** ought to be valuable in cases which show a manifest hyperæmia of the liver. Morgan recommends Aconite in such cases.

Hahnemann suggested *Argentum* and *Scilla* as suitable remedies. *Natrum*, *Nux*, *China*, *Colocynthis*, *Mercurius*, *Sulphur*, and a long list of others, have also had their advocates.

Asclepias vinetoxicum.—A curious incident is related by Dr. Hughes in the *British Journal of Homœopathy* for 1866. He says: "It seems that a diabetiform complaint among sheep was traced to their feeding on asclepias, and that the conjecture was confirmed by experiments made in the veterinary school at Vienna The administration of the juice to sheep induced diuresis and violent thirst. Nothing is said, however. as to the presence of sugar in the urine. Five persons attacked with diabetes mellitus were relieved by taking Asclepias 6th dilution. One of them, whose urine contained 60 grammes of sugar to the litre, found the quantity reduced to 60 centigrammes per litre under the influence of this remedy, $\frac{1}{100}$th of the original quantity."

Hygiene plays an important part in the treatment of diabetes.

The function and nutrition of the skin is materially affected in the course of the disease, and it is essential that proper care be taken of it.

For this purpose warm baths should be taken at least twice a week, and no day should pass without giving the whole surface of the body a good rubbing. This will stimulate the circulation, improve the nutrition, and prevent, in many cases, the formation of boils.

The writer would recommend inunctions of olive oil, not only to soften the integument which has a tendency to become dry and rough, but also to improve nutrition. This method has given excellent results in other wasting diseases, and it certainly seems indicated in diabetes.

It is needless to say that the patient should have the purest of air to breathe. No patient can carry on a successful battle against disease if he cannot have the most wholesome surroundings; and no item is so vital as pure air.

Attention must be paid to the bowels, which have a tendency to become inactive and constipated. It is not advisable to give purgatives to arouse them to action; the mild and effective aperient waters will do much better. Those of Vichy, Carlsbad, and Friedrichshall have a wide reputation on account of their favorable action in diabetes, and, when possible, should be used regularly; they not only regulate the action of the bowels, but at the same time they relieve the intense thirst which torments the patient. Apollinaris, soda, and seltzer waters are also refreshing beverages. If the stomach is badly deranged and the patient drinks too much water, the thirst may be often quieted by sucking small pieces of ice.

When it is deemed advisable to use alcoholic stimulants, whiskey is to be preferred; but it is an open question how much, if any, good this drug will do in any case.

Regular daily exercise, even in wet weather, such as walking when the weather is pleasant, and gymnastics, is an important item; but care must be taken to stop short of even slight fatigue.

H. DIABETES INSIPIDUS.

BY CHARLES GATCHELL, M.D.

Synonyms.—Polyuria; French, Polyurie, Diabète insipide; German, Zuckerlose Harnruhr.

Definition.—The name of diabetes insipidus, or polyuria, has been given to a morbid state characterized by a persistent increase in the daily amount of urine voided, which is free from both sugar and albumen, and which does not arise from any disease of the kidneys. This is the one essential feature of the disease, but other symptoms, largely dependent upon this profuse urinary excretion, are present, such as intense thirst, dryness of the skin, and, occasionally, emaciation and prostration.

The disease is not so likely to reach a fatal termination as the saccharine diabetes, but it is less under the control of the physician.

Our knowledge of its ætiology and pathology is very meagre; hence the treatment is necessarily uncertain, unscientific and, as a rule, unsatisfactory.

Historical.—Diabetes insipidus has only been recognized as a distinct morbid entity for about one hundred years.

Thomas Willis discovered the presence of sugar in the urine of diabetes mellitus in 1674, but the true import of his discovery was not recognized for many years. Before his day it was absolutely impossible to distinguish between the two diseases, although physicians had noticed that all their cases of chronic diuresis did not follow the same course.

Sauvages, a physician of Amsterdam, in the middle of the eighteenth century, pointed out that saccharine diabetes was a distinct disease, but he did not go so far as to recognize diabetes insipidus. This was done positively by P. Frank, about 1790, when he divided all cases of chronic polyuria into *diabetes mellitus*, or *verus*, characterized by the presence of sugar in the urine, and into *diabetes insipidus*, or *spurius*, in which there is no sugar in the urine.

Attempts have been made since Frank's time to subdivide the latter class according to the condition of the urine. Thus have arisen the names:

Hydruria, in which the normal solid constituents are at par, and only the quantity of water increased.

Azoturia, in which the absolute amount of urea is increased.

Anazoturia, in which it is diminished. Phosphaturia, Oxaluria, etc. This classification is of no practical value.

Ætiology.—Our knowledge of the causes of diabetes insipidus is extremely limited.

Age.—Age seems to have no influence over the disease, for it has been seen in a new-born infant and in the aged; but it is more apt to attack young people than the aged. It is most commonly developed, according to statistics, between 20 and 30 years of age.

Sex.—Males are more apt to suffer than females, the average being placed by statisticians at 2 to 1.

Heredity.—Some remarkable examples of the hereditary predisposition to polyuria have been recorded.

It has been traced four generations, and three or more generations have suffered from the disease.

It has been known to alternate with diabetes mellitus, but the data are so meagre that nothing of particular value has been learned; the facts point, however, to a possible pathology which will be considered.

Exciting Causes.—Diabetes insipidus has been traced to a variety of exciting causes, but, undoubtedly, injuries or diseases of the nervous system are among the most common; to this may be added mental emotions, colds, drinking-bouts, etc.

Pathology.—The marked relation between diabetes insipidus and lesions of the central nervous system, taken in connection with the known results of certain physiological experiments, points almost conclusively to a nervous origin of this disease.

Autopsies have revealed the fact that in many cases there was a lesion of the medulla oblongata or of the floor of the fourth ventricle. This confirms the physiological experiments of Claude Bernard, who observed an increase in urine free from sugar, but sometimes containing albumen, to follow puncture of the fourth ventricle above the level of the glycogenic centre.

His results were also confirmed by Eckhard, who sought particularly to track the course of the nervous influence as well as to locate precisely the centre which governs the action of the kidneys.

The fibres pass down the spinal cord at least as far as the seventh cervical vertebra, because injury to the cord above that point is followed by an absence of renal activity. The sympathetic also controls the action, because irritation of fibres is followed by an increased flow of urine; they do not reach the kidneys with the splanchnic nerves, for their action has been demonstrated to be inhibitory.

With these meagre physiological facts we must be contented at present. They do not explain the nature of diabetes insipidus, but they indicate a probable nervous origin, which supposition is strongly supported by clinical facts and post-mortem revelations.

Morbid Anatomy.—If there is an essential lesion in this disease, it has not yet been discovered. But injuries and diseases of certain portions of the nervous system have been too often observed in connection with polyuria to be purely accidental, and it is undeniable that they probably stand in the relation of cause and effect. Concussion of the brain, new formations near the medulla and fourth ventricle, hæmorrhages, softening and inflammations, epilepsy, injuries and chronic diseases of the upper part of the spinal cord, have all been observed in connection with polyuria. Their variety complicates the pathology of the disease but points very strongly to a purely nervous origin.

Certain changes have been noticed in the kidneys. Usually there is some atrophy and degeneration of the renal substance. Hyperæmia and abscesses have been observed. These changes are not common, and cannot be considered the essential lesion.

After the disease has continued for a long time, the walls of the bladder become thickened to compensate for the over-distension to which they are subjected; the ureters become dilated, and the kidney sacculated. These changes are mechanical so far as physics can be applied to a living body.

Changes in other organs, when present, are purely accidental. There is no relation between diabetes insipidus and pulmonary and hepatic troubles as there is between them and the saccharine form.

Symptomatology.—The two prominent symptoms of diabetes insipidus are diuresis and thirst; in fact, they seem to be the only symptoms occurring in many of the cases. But in other cases, particularly in those arising from some organic lesion of the nervous system, symptoms dependent upon them are present. In such, naturally chronic, the onset of the diabetes is quite gradual, manifesting itself first by unusual frequency of urination, accompanied by a sense of fulness in the region of the bladder, and a refreshing sense of relief after passing a large quantity of pale, clear urine.

The quantity voided in twenty-four hours in the same patient varies considerably when the disease is at its height, and the variation is still more marked in different cases. The amount may be only slightly above the normal, but it has been known to reach 43 quarts. Drinking has considerable effect upon the quantity passed; if a patient controls his thirst, the amount of urine voided is less than when he drinks often and freely. The amount of urine passed is greater than in health, even when the quantity of water taken does not exceed the amount usually drank by a healthy person. The increase of urine must be at the expense of the economy; hence, there is no wisdom in lessening the abundance of the secretion by inflicting upon the patient the punishment of resisting the longings of a tormenting thirst.

Thirst exists in direct proportion to the amount of urine voided; it is so great that persons have been known to drink their own urine when no other drink could be had.

The question was raised whether the quantity of urine exceeded the amount of water taken into the system, and for some time this was supposed to be a fact; but when the total quantity ingested, the liquids and the watery portions of solid foods, was carefully estimated, the equilibrium was found to be established.

Another symptom present in most cases, and dependent upon the two foregoing, is dryness of the skin. These patients rarely perspire, as occurs in some cases of diabetes mellitus when the sympathetic is involved.

No tendency exists to the formation of boils and carbuncles; in fact, most patients suffer no inconvenience except from the diuresis and thirst.

The appetite is occasionally increased or perverted, particularly if the disease develops in an hysterical person, but it is not so marked as in diabetes mellitus.

As has been stated, when the disease is associated with well-defined affections of the nervous system, the symptoms which belong to the latter are added to those of diabetes. Thus we may find anæsthesia, nausea, vomiting, paralysis, derangements of sensation, and others.

The disease is persistent, but of itself rarely terminates fatally; it has been known to exist fifty years. When dependent upon some other morbid condition, it follows closely the course of the latter. With its cure the polyuria usually disappears. When idiopathic, it is of unlimited duration.

It is a rather peculiar feature of diabetes insipidus that it is held in check by certain intercurrent febrile affections; at such times the thirst is less intense, the quantity of urine decreases, and its specific gravity grows higher. This improvement is not permanent, however, and with convalescence from the fever, the symptoms of polyuria again increase. The diseases which are known to thus influence the course of diabetes insipidus are varioloid, typhus fever, pleurisy, acute rheumatism, pneumonia, and erysipelas.

The urine is modified, but does not contain abnormal constituents. The relative amount of the solids is changed. Owing to the large quantity of water voided, the urine is very pale, has a slightly greenish tinge, and is always clear when first passed. The specific gravity is lowered, usually ranging from 1.005 to 1.010, but sometimes going as low as 1.001. It will be noticed that this description corresponds closely to the urine found in cases of contracted kidney, a condition from which polyuria must be differentiated.

The total amount of urea eliminated in twenty-four hours is increased, though the relative amount in a given quantity of urine is lowered because of the great increase in the watery portion.

Nearly all the other solid constituents are increased, and this is accounted for upon the theory that the unusual quantity of water which is constantly passing through the system readily dissolves the excretory substances, and washes them out of the tissues, as it were.

The urine is very unstable; that is, it quickly decomposes, and soon becomes turbid from the presence of bacteria.

I take the liberty of quoting from Tyson's work on Diabetes the following cases, which illustrate the remarkable thirst of patients afflicted with this disease:

"A Frenchwoman, aged 40 years, had been afflicted from her birth with a drought beyond example. She drank every day nearly two pails of water, and was eventually driven from home by the ill-treatment she received in consequence of this expensive habit. At 22 she married a cobbler. She drank four pailfuls a day, and became the mother of eleven children, drinking more when she was pregnant and least when out of health. When 40 years old she was examined by a scientific commission, and drank in the presence of its members fourteen quarts of water within ten hours, and voided ten quarts of nearly colorless urine.

"Dr. Dickinson reports the case of a farmer, 51 years old, in good general health, and equal to severe farm labor, who usually drank a quart of water at a time, and repeated the draught sixteen or eighteen times in the day and night, passing about as much urine as he drank water. In one night, under observation, he passed between five and six quarts of urine without sediment.

"These cases show also the extreme duration of some cases, and the otherwise excellent health enjoyed by them. Very little serious disturbance seems to result as long as water is supplied to quench the resulting thirst."

Diagnosis.—The diagnosis of diabetes insipidus ought not to be difficult. Characterized by unusual thirst, frequent desire to urinate, the passage of large quantities of colorless, watery urine, it is rarely mistaken for any other disease. But every patient who passes an extraordinary amount of urine is by no means a sufferer from diabetes insipidus. There are occasionally met cases in which there is a temporary increase of urine, due to hysteria or to the ingestion of large quantities of liquids. Diuretics cause a temporary increase in the amount of urine voided. During the period of convalescence from many acute diseases the same symptom occurs.

Neither of these cases, while having the prominent symptoms of diabetes insipidus, would be mistaken for the latter, for the course and concomitant symptoms of each would be sufficient to establish the differentiation.

There is no danger of mistaking this affection for diabetes mellitus, on account of the presence of sugar in the latter.

It is most likely to be mistaken for some forms of chronic kidney-trouble, as contracted kidney, amyloid degeneration, pyelitis, and hydronephrosis. These conditions are accompanied by marked diuresis, the urine having many of the characters of that of diabetes insipidus. But a careful test will reveal the presence of small quantities of albumin in most of them, and if not found at one time, it surely will be at some other, for examinations should be repeatedly made in all cases of urinary trouble.

Albumin is occasionally absent from the urine in cases of contracted kidney, but not for any great length of time. A careful attention to the history of the cases will, however, aid greatly in making the differential diagnosis.

Treatment.—It has already been stated that diabetes insipidus is an obstinate disease, and that, so far, the success of the profession in its treatment has been unsatisfactory.

If we can trace the polyuria to the existence of some other disease, it is proper to direct our efforts to the cure of the primary affection, and upon its removal depends our success in the treatment of the diabetes. As Senator says, the disease is troublesome rather than dangerous, and if we can do nothing more we may be able to make the patient's condition more tolerable.

Care of the skin will promote perspiration, and thus divert some of the liquid from the kidneys. For this purpose hot baths and rubbing are recommended.

Electricity has been used beneficially, and it certainly seems indicated in cases of spinal or cerebral diseases. The galvanic current is more appropriate than the faradic. The amount of urine has been reduced by its action from 5957 c.c. to 1904 c.c. in seven weeks. It should be applied about five minutes daily to the spine and hypochondrium.

The medicinal treatment is limited. Many remedies have been suggested, and, under the action of some, cases have occasionally improved. The provings of many remedies correspond more or less closely to the symptoms of the disease, and among them are *Causticum*, Phosphoric acid, Scilla, Digitalis, Natrum muriaticum, Lycopus, and Secale.

Causticum is specially indicated in hysterical subjects.

Hughes says concerning Scilla: "The first case in which I gave it was an Indian officer, who had for two years been passing an inordinate quantity of pale urine. There were no special symptoms present, but the drain seemed to keep his health and strength below par. Phosphoric acid, which I gave first, did no good. He then got Scilla 2d, three drops in water twice daily. After taking this for three or four weeks, he reported that the urine had fallen to its normal amount, and that he was feeling quite well. I have since given it in a similar case with equally good results."

The proving of Secale corresponds closely to diabetes mellitus, save that it does not cause sugar to appear in the urine. It is a remedy that ranks high in the estimation of the allopaths in the treatment of diabetes insipidus. They give it in thirty-drop doses, on the theory of its action on the vaso-motor nerves.

Many brilliant recoveries are reported to have followed its use.

DISEASES OF THE URINARY ORGANS.

A. DISEASES OF THE KIDNEYS.

BY J. H. McCLELLAND, M.D.

INTRODUCTORY.

THE diseases to be considered under this head are of obtrusive significance to practitioners of every class, general and special, for many reasons, among which the following may be specified.

First, because of their increasing prevalence; or rather on account of their more frequent recognition of late years.

Second, their insidious approach, so that in some forms and in many cases serious headway has been made before the attention of the patient or physician is arrested, and the importance of the malady recognized.

Third, their *ante* and *post* relations to diseases of other organs, as evidenced by the various morbid conditions resulting from primary kidney affections on the one hand, and the secondary effects produced upon the kidneys by other diseased organs on the other; for example, the morbid conditions produced in the general organism by retained matters which diseased kidneys fail to eliminate, as well as the dropsies, the albuminuric retinitis, etc., which directly result from bad kidneys. Again, notice the almost certain implication of the kidneys in various heart and lung affections, the destructive effect produced by the passage of biliary matters, irritating drugs, diabetic products, calculous concretions, etc., through the kidneys. We should note also the wearing effect upon the kidneys of the excessive functional activity into which they are ofttimes whipped by sympathetic stimulation in certain general and central nerve troubles.

Fourth, the prognostic gravity of most kidney diseases, as shown forth by heavy bills of mortality.

Such are some of the reasons which make the study of kidney affections of paramount interest, and render necessary a careful scrutiny of many subjective and objective conditions remote from the *fons et origo mali*. The oculist finds a writing upon the wall of the retina which tells of serious kidney malady, the obstetrician finds in an abnormal secretion of the kidneys a sufficient cause for alarm, and the surgeon wisely stays his hand when intimation of serious kidney lesion is found in the urine.

There could be found excellent reasons for almost any classification of kidney affections that might be adopted. Each writer endeavors for himself to lay out the most logical and effective plan. The arrangement here adopted doubtless has its objections, but on the whole will be found to cover the ground in a somewhat practical way. For instance, congestion so often occurs without apparently going further, that a section is devoted to its particular consideration. Then hæmorrhage, although resulting from a variety of causes, has been regarded as of sufficient importance to require special mention.

Some difficulty has been experienced in satisfactorily separating or combining the various inflammatory affections of the kidneys so as to simplify the classification, render the text of practical value to the practitioner or student, and at all hazards to preserve a due regard for the facts of pathology.

In order to avoid a confusion in the use of terms, albuminuria has been regarded and treated not as a disease *per se*, but as a condition of the urine arising from a variety of causes, yet of such special significance as to call for separate consideration.

The term nephritis is made to apply to those forms of inflammation of the kidney, or parts of the kidney, which do not properly come under the head of Bright's diseases, inflammations that tend to suppuration especially. Under the term Bright's diseases are included the three specific forms of kidney malady, the successful study of which was begun by Richard Bright, and pursued since then by the ablest pathologists until something like a definite understanding has been reached as to what the term should mean; viz., certain forms of renal disease having characteristics common to all, and which pursue a certain definite course.

Further than this, space is given for the consideration of uræmia, renal calculus, cysts, tumors, and carcinoma, anomalies of position, etc., and animal parasites. Nephralgia has also been briefly treated separately. Addison's disease is a constitutional malady, and not essentially a disease of the kidneys; and although the supra-renal capsules are anatomically involved, no symptoms are referable to the kidneys, and there is no relationship with other diseases of this organ; therefore its consideration is out of place in this chapter. The same observation applies to diabetes mellitus. In this disease the kidneys, though the chief channel for the transmission of saccharine products, are less affected than other organs, notably the liver and pancreas. There is no constant or characteristic lesion in this disease calling for special mention in this connection. We may find, however, a general hyperæmia of the kidneys; in some cases an unusual hardness is observed, while in others a fatty degeneration obtains. We need only notice further that the urinary tract is also subject to irritation from the oxidizing action of the sugar held in solution.

In the preparation of this paper the sources of information have been so various, and so little regard to exact quotation has been observed, that it is quite impossible to particularize these sources and note the proper credits; suffice it to say that the pathology so ably espoused by T. Grainger Stewart and by Dickinson has been mainly followed. The treatment has been gathered from many authorities, as well as from personal experience.

The writer is under obligations to R. W. McClelland, B.S., M.D., for valuable assistance in preparing the text.

RENAL HYPERÆMIA.

Synonym.—Congestion of the kidneys.

Congestion of the kidneys consists in an abnormal determination of blood to these organs, and here, as elsewhere, is subject to two phases, the active and the passive, known also as the acute and chronic.

Ætiology.—Renal congestion is the result of some abnormal stimulus setting-up a condition of engorgement in the part, or it is due to obstruction in neighboring parts.

In the active form, the following are some of the most effective causes: exposure to cold or sudden changes in temperature; blood-poisoning from infectious diseases, principally scarlet fever, measles, and typhus; prolonged use of, or over-dosing with, drugs such as Nitre, Copaiva, Turpentine, and Cantharides; the altered condition of the urine in different diseases, as in diabetes mellitus or in acute jaundice. It also occurs under certain malarial manifestations.

The passive form of congestion, consisting of an engorgement of venous blood, is due most commonly to right-sided heart lesions, such as valvular insufficiency and dilatation with their consequent lung complications, such as emphysema and pleuritic effusions; in a word, anything which interferes with the proper venous return. Pregnancy or abdominal tumors, by reason of their pressure on the inferior vena cava, will give rise to congestion of a passive character.

Pathology.—In the acute form of congestion the organ is generally increased in size. The congestion is not equally distributed over the kidneys, but appears generally in the cortical or medullary portions, and is more marked at the base of the pyramids. The color of the kidneys is darker than natural, the capsule is non-adherent, the surface is smooth, and the tissues seem softer and more moist than usual. When cut into, the exposed surfaces present scattered dark points or minute ecchymoses, and there is a discharge of a dark-colored, watery blood, showing an œdematous condition. Microscopically, we find evidences of engorgement of the bloodvessels and an infiltration of serum into the intertubular structure. In the tubules the epithelium is found to be granular, and the lumen choked with coagulated fibrin, especially in the cones. The stroma is generally unaffected. In passive congestion, especially when due to heart-disease, there is not the same increase in volume as in the active form, but there is a hardness which is quite characteristic. The surface is red and smooth, but later on in the chronic stage the surface is somewhat irregular, the capsule still remaining non-adherent. The medullary portion is darker than the cortical, the latter presenting a streaked appearance. The congestion not being so violent as in the active form, the Malpighian tufts lack the prominence found in the latter; but the vascular pressure being of longer duration, the veins and capillaries become distended, and to this distension is due in great part the hardness of the organ. Both active and passive congestion may exist without any inflammatory process, or they may excite, or be accompanied by, inflammation of the uriniferous tubules. Finally, catarrhal changes are sometimes found with the active, but never with the passive, congestion.

Symptomatology.—The symptoms are almost exclusively of an objective character and relate to changes in the urine, pain being rarely present. The urine is diminished in quantity, with a normal or slightly increased specific gravity. Albumen is present in greater or less quantity, with probably a few hyaline casts. Albumen and blood appearing simultaneously points to congestion, while the presence of albumen alone is indicative of an inflammatory state.

Diagnosis.—The diagnosis is to be made between hyperæmia and the early stage of acute Bright's disease. Here the causes must be taken into consideration, mainly the cardiac lesions and venous obstructions. In both the urinary secretion is scanty, but in hyperæmia it is more highly colored and less liable to contain epithelium and casts; the specific gravity, as a rule, is also normal.

Prognosis.—When the exciting cause is transient, the prognosis is generally favorable. The duration and termination depend entirely upon the nature of the cause. Passive congestion occurring in connection with cardiac troubles is unfavorable, owing to the difficulty or impossibility of removing the sustaining cause and the attendant debility. In the congestive malarial fevers of hot climates the interference with the functions of the kidneys by congestion may be severe and hasten a fatal termination, especially when there is profuse hæmorrhage associated with this condition.

Treatment.—*General Management.*—The active form of congestion requires local and palliative treatment in addition to the indicated remedy if we would secure the quickest relief. As hyperæmia is frequently but a prominent symptom depending upon neighboring visceral derangements, appropriate treatment must also be directed to these disturbing centres. Thus it may be due to a defective action of the heart or secondary to congestion of the liver, which conditions must primarily claim our attention. In case of active renal congestion relief will be obtained from the employment of such adjuvants as dry cups over the renal region, hot fomentations, or the application of Hamamelis with hot water, in the proportion of one to two. Where it is from traumatism, nothing takes the place of diluted Arnica applied hot and by compresses. Mild diet must be enjoined, and the free use of diluent drinks, as for example, "cambric tea," a harmless compound of hot water with a little milk and sugar, flaxseed tea, slippery elm, gum-arabic water, *et hoc genus omne*. When due to exanthems, such as scarlet fever and measles, the general and local symptoms abundantly indicate the proper remedies. In such cases the skin should receive prompt attention, *i. e.*, frequent but careful bathing with warm water (to which is added bicarbonate of soda, one teaspoonful to the quart) followed by a slight application of vaseline or cocoa butter. An active condition of the skin must be encouraged, but great care should be exercised in administering the bath. The patient should be under cover and between blankets until thoroughly dried and the usual clothing restored. When passive congestion is present, the promptness of the relief will depend upon the curability or chronicity of the producing causes.

Therapeutics.—*Aconite*, *Arnica*, *Belladonna*, *Berberis*, *Bryonia*, *China*, *Ferrum phos.*, and allied remedies, among which *Terebinth.* holds an important place, will be most frequently of service.

The special indications for each of these, and other, remedies will be found under other heads, and need not be repeated here.

HÆMATURIA.

Blood is often found mingled with the urinary secretion, and may have its source either in the kidneys, ureters, bladder, or urethra. It is a symptom due to varied pathological conditions, and is often a source of alarm to the patient if not to the physician. Its presence in the urine, when occurring in quantity, is easily detected, but under some conditions the microscope or spectroscope must be used to determine its presence. The guaiacum test is a good one, and consists in the emulsion of equal parts of guaiacum and oil of turpentine. The suspected urine is added slowly, and if blood be present the solution takes on a blue tint.

Ætiology.—Hæmaturia may arise from either of the following causes: renal concretions which wound the delicate mucous surfaces in their passage; wounds or blows in the region of the kidneys; active or passive congestion of the kidneys; violent muscular exertion; inflammatory condition of the kidneys and urinary tract; it may be secondary to acute diseases or due to infarctions arising from embolism or capillary thrombosis; irritating drugs, such as cantharides and turpentine. Scurvy and purpuric forms of disease are frequently accompanied with hæmorrhage from the kidneys in consequence of the fluid state of the blood. Suppression of physiological or habitual hæmorrhages has been followed by hæmaturia. Vesical hæmorrhage is mainly due to traumatic inflammation, malignant growths, and occasionally takes place vicariously from bleeding hæmorrhoids.

Pathology.—The changes noted in the kidneys are similar to those seen in congestion, except where infarctions or calculi are present. When the kidney is laid open, we may find numerous ecchymotic spots, varying in size, and bleeding freely. When due to embolism and infarction, we find hard wedge-shaped masses in the cortical substance, with edges tapering toward the hilum. They are dark in color at first, but later may assume a lighter hue, and undergo caseous degeneration. They also form centres of infiltration which may go on to abscesses or take on gangrenous conditions. Sometimes we find small spots scattered throughout the kidney which are due to capillary thrombi and are also liable to degenerate into small abscesses.

Symptomatology.—The symptoms vary according to the point whence the hæmorrhage proceeds, while the condition itself is, as a rule, only an additional symptom to others already in existence.

Should the hæmorrhage occur in the kidney, it may be retained by coagulation and cause pain in the renal region, which may at times be very intense. The diagnosis under these circumstances is very difficult, and often impossible. Sometimes the blood passing from the kidneys coagulates in the bladder and causes so much distress that the trouble is often referred to this organ. Again, we may have heat, weight, or pain on pressure in the lumbar region; the pain may extend along the ureters and into the groin. Retention of the urine in consequence of the blocking up of some of the urinary passages is a most important complication.

Passive hæmaturia during the course of a zymotic disease must be distinguished from acute desquamative inflammation as a sequela of the same. When a patient suffering with cardiac disease or pyæmia is attacked suddenly by a chill, pain in the back and vomiting, we have reason to fear a renal infarction.

When there is local distress in the renal region in connection with the hæmorrhage, it is probable that the kidneys are the organs involved; in this case the sanguinary admixture is very intimate. Again, in renal hæmorrhage, the blood is more or less decomposed and discolored, and gives the urine a brownish-red or dull, smoky tint, depositing a brownish sediment. If tube-casts are present, all doubt is removed. There is generally an absence of clots in renal hæmorrhage, but these may be present should the hæmorrhage be excessive or its flow impeded. These clots are of a whitish color and of cylindrical shape, and may cause considerable pain in their passage through the ureters. When the hæmorrhage comes from the bladder, we have local pain and uneasiness and distress during micturition. The first discharge of urine is usually clear, while the last portion may contain almost pure blood, which, instead of being equally diffused through the urine, is more or less clotted. When flowing in drops or at other times than during micturition, the hæmorrhage is more likely to be from the urethra. When due to cancer or other neoplasms, the hæmorrhage is generally profuse and persistent. When from inflammation accompanying infectious diseases, it is not liable to be severe or constant.

There is a form of hæmaturia peculiar to hot climates, due to the presence of a parasite—the Bilharzia hæmatobia—which infests the minute veins of the pelvis of the kidney. The condition is also produced by the presence in the blood of the Filaria sanguinis hominis.

Prognosis.—When idiopathic, the hæmorrhage may be considerable and no serious consequences result; but when symptomatic, it may be unfavorable on account of the exhaustion produced. This is especially true when it is due to the presence of calculi or cancer. If the loss is not excessive, the result is often beneficial from the relief given the hyperæmic state of the renal vessels. The prognosis depends mainly upon the affection which causes the hæmorrhage, and will be favorable or otherwise according to the nature of this affection. The blood may coagulate in the uriniferous tubules and by its retention destroy the function of a portion of the kidney, and in time set up renal degeneration. Calculous concretions may also form around a hæmorrhagic clot. Infarctions are to be feared on account of the probable degenerative changes which their presence may excite in the kidneys.

Treatment.—*General Management.*—The treatment depends greatly upon the cause and degree of the hæmorrhage. As intimated, the bleeding is in many cases a relief to surcharged vessels, especially when associated with acute inflammations of the kidneys or due to an overdose of a drug acting on the kidney.

When supplemental, the treatment should be directed toward the proper restoration of the suppressed discharge. In cases which depend upon the presence of cancer, or allied diseases, local applications of cold to the parts, either by ice bags or other means, are serviceable. Sometimes a catheter is to be used and the clotted blood in the bladder broken up by frequent injections of water and then emptying it by an exhaust-syringe. Throwing the aqueous extract of Hamamelis into the bladder will sometimes promptly arrest a renal hæmorrhage; two or three ounces diluted with as much water will serve the purpose well. In every case, rest is an all-important and essential element of treatment.

Therapeutics.—**Aconite.**—Where there is local heat, soreness and throbbing, or all the conditions of an active congestion.

Arnica.—When the bleeding is due to a blow or fall.

Arsenicum.—This remedy has local symptoms of strangury with burning pains through the urinary tract. The urine is decomposed, dark in color, and contains bloody coagula. Paralytic symptoms of the bladder; anguish and restlessness. The general condition of the patient will furnish the best indications for this remedy. The hæmorrhage calling for Arsenicum will be very likely to occur in debilitated and broken-down constitutions in which some inflammatory disease has been running a protracted course.

Arsenicum hydrogenesatum has proven itself to be an important and successful remedy in the experience of Dr. J. F. Cooper. The indications are: general prostration; weak and languid on awaking. Urine suppressed, followed by vomiting; weak and very restless. Hæmaturia and hæmorrhages from the mucous membranes generally.

Cantharides.—This remedy has in a marked degree many of the conditions associated with the disease under discussion. Its pathogenesis points to an inflammatory action along the entire urinary tract. With this we have constant desire to pass water, which is ineffectual, or only a few drops are passed. The urine is frequently mixed with blood, and very seldom amounts to a profuse discharge. Also when exudation-casts are present with the bloody urine, or when the hæmorrhage is caused by renal calculi. Violent pains in the back extending along the ureters into the bladder. Restless, uneasy feeling with tossing about at night.

Ipecacuanha.—For profuse hæmorrhage with nausea and prostration; oppressive sensation in the chest.

Millefolium.—Profuse secretion of urine, with tenesmus; hæmaturia with pain in renal region; pressive pain in the urethra during micturition and when passing blood; chilliness and weakness.

Nux vomica.—After the excessive use of alcohol or drugs; suppression of hæmorrhoidal or menstrual discharges; full, distended feeling through the abdomen and loins; stagnated venous circulation.

Phosphorus.—In depraved constitutions; after sexual excesses, or when the blood is vitiated or disorganized.

Secale.—In conditions similar to those calling for Phosphorus. Passive hæmorrhage; blood thin; blood-corpuscles wanting in consequence of dissolution; painless discharge of thick, black blood in consequence of kidney disease; coldness of the body; cold perspiration on the forehead; great weakness (Raue).

Terebinthina.—Urine of a brownish or blackish color, due to the presence of hæmatine or disorganized blood-corpuscles, with coffee-ground sediment. Urine passed in drops, mixed with blood; or the first discharge may be pure blood. Cantharides is associated with inflammatory conditions and exerts an influence upon the bladder, while Terebinthina shows more of a passive condition and has an affinity for the kidney. The hæmorrhage is apt to be more profuse in the latter drug. When the hæmorrhage is due to decomposition of the blood, as in scurvy or in those living in damp dwellings, or in sailors after long confinement on shipboard, when the constitutional symptoms are not marked. Burning, drawing pains in the region of the kidneys; urging and pressure in the bladder. Cutting pains from the bladder to the kidneys, or upward toward the umbilicus. Weakness, prostration and nausea are frequent accompaniments.

Uva ursi.—Constant urging to make water, and straining with discharge of blood and slime; or constant straining without any discharge at all or only a few drops of urine; after this, cutting and burning in the urethra, which is succeeded by a discharge of blood; hard stools (Raue). Useful, according to Hughes, in vesical troubles consequent upon renal affections; renal hæmaturia and pyelitis.

Other remedies which may be of service are *Calcarea carb.*, *Camphora*, *Colchicum*, *China*, *Crotalus*, *Erigeron*, *Hamamelis*, *Lachesis*, *Lycopodium*, *Mercurius*, *Mercurius corr.*, *Mezereum*, *Nitric acid*, *Pulsatilla*, *Sulphur*, *Veratrum viride*, *Zincum*.

NEPHRITIS.

Synonyms.—Inflammation of the kidneys, Suppurative nephritis.

The term nephritis is by many writers used synonymously with Bright's disease, or made to cover the same ground. But, as intimated in the introductory, it is the intention here to treat under the one head—nephritis—all those inflammations to which the kidney is subject, excepting those which have their specific location in the three following structures: the tubules, the vessels, and the stroma, *i. e.* Bright's diseases. One exception is made to this—suppurative nephritis—in which the body of the organ is involved in the suppurative process.

Therefore the conditions to be noted under this head are the following: suppurative nephritis, pyelitis, hydronephrosis, and perinephritis.

SUPPURATIVE NEPHRITIS.

Definition.—By suppurative nephritis we mean an inflammation going on to suppuration, the same in character as such a process in any other tissue of the body, and distinct from the specific forms found under Bright's disease. The conditions present are accompanied by a bloody, albuminous or purulent urine.

Ætiology.—The causes of suppurative nephritis may be divided into idiopathic, external, and internal.

In some cases the ætiology is obscure; in others the cause is found to be a blow or an injury in the renal region, or an exposure to cold.

Those causes originating within the system include the presence of irritating substances, such as poisons or calculi; embolism; obstructions to the escape of urine, such as strictures, enlarged prostate, and catarrh of the bladder; reflex irritation of the kidney and the presence of septic matters in the blood, pyæmia with consequent metastatic abscesses. The disease is found chiefly among middle-aged persons, and more frequently among males than females. The acute form may follow secondarily inflammations of other organs, cerebral and cardiac affections, or be associated with the rheumatic, gouty, tubercular, or scrofulous diathesis.

Pathology.—The inflammation may invade the entire kidney, but generally only a part of it is involved. The capsule may be nonadherent, or it may be bound down at various points by adhesions, in which case the forcible detachment brings away portions of the kidney substance or clots of pus. The purulent deposits or abscesses are the result of the three well-known stages: 1st, congestion with exudation; 2d, consolidation; and 3d, suppuration. Under the microscope a section of the tissue belonging to the initial stage will frequently show small groups of bacteria. Their presence is sufficient to bring about the subsequent inflammation-changes.

The affected kidney becomes enlarged and its tissues are congested and infiltrated. The infiltrated fluid may be absorbed or changed in color, and small points of suppuration appear in the tissues. These centres vary in size so that a larger or smaller portion of the kidney, and sometimes the entire organ, may be involved in the suppuration. Small hæmorrhagic effusions are often seen along with the purulent deposits. These purulent deposits may disappear into cicatricial tissue; or the pus may become encysted and a part of its constituents absorbed; or it may be discharged into the pelvis of the kidney or into neighboring organs.

Symptomatology.—The attack is generally ushered in with sensations of chilliness—a marked rigor being rare—and local pain. Dull, sharp or lancinating pains of variable intensity frequently extend over the entire renal region; they are aggravated by pressure, motion, or lying on the affected portion, and by the warmth of the bed. The pains may also extend into the abdomen, bladder, and testicles, the latter at times being spasmodically drawn up toward the abdomen, with numbness of the thigh. In women, the pain may extend into the round ligaments and thighs. There is also frequent and difficult urination with scanty discharge of high-colored or bloody urine. The general system is invariably affected, and violent fever, hurried, small and contracted pulse, hot and dry skin, and intense thirst are present. When due to external violence, the temperature may be below normal from shock, and the extremities cold and clammy; nausea and vomiting are often persistent, although the tongue may not show any marked gastric derangement. The appetite fails, and the bowels, especially in the early stage, are apt to be constipated; but diarrhœa with tenesmus is a not unfrequent accompaniment.

The disease may be checked at this point, and prompt recovery follow; but as a rule the unfavorable symptoms progress. A change for the worse is indicated by the onset of violent rigors and a sudden rise of temperature which assumes a more or less remittent or intermittent character; the pains, at first dull and aching, are increased in severity; the coated tongue and deranged stomach show a greater disturbance in the digestive organs. The detection of pus in the urine indicates the advance of the disease; with the pus there is frequently an admixture of blood and, occasionally, of tube-casts. The quantity of urine eliminated varies according to the amount of kidney-tissue affected. If the disease is limited to one kidney or to a small portion of both, the quantity of urine is not much lessened. During the progress of suppurative nephritis a peculiar condition may be developed, known as renal phthisis. This condition may run a very chronic course, showing traces of pus all the time. Wasting of tissue, failing appetite, thirst, dry tongue, flashes of fever, and an easily inflamed skin are its natural concomitants.

As a rule, suppurative nephritis attacks but one kidney, and is manifested by a well-defined swelling in the lumbar region extending downward. Renal abscesses may form without showing any definite symptoms pointing to the kidneys. This holds true in pyæmia, or when there is an extension of the suppurative process from the lower urinary tract.

Diagnosis.—Suppurative nephritis is distinguished from pyelitis by the presence of casts, but the constitutional symptoms are similar; from perinephritis by the presence of casts and the absence of a large tumor.

Prognosis.—The primary inflammation due to a cold or a transient cause is readily relieved by appropriate treatment. When suppuration sets in, the prognosis should be guarded, and if the process be very extensive the prognosis is always bad. When the suppurative process is the result of acute Bright's disease and the abscesses are small, recovery frequently occurs. The prognosis is more favorable when only one kidney is the seat of the disease, and when no serious complications exist.

Treatment.—*General Management.*—Absolute rest should be enjoined, and all articles of food which may furnish solid constituents should be avoided. The use of diluent drinks should be encouraged, and the system toned up by nourishing food. A meat diet is to be strictly prohibited. Fresh water may be given freely, while stewed fruits and acidulated drinks prove palatable and beneficial. In case of severe local pain and inflammation, apply hot fomentations and poultices.

Surgical interference may sometimes be required; where calculi are suspected an incision through the lumbar parietes should be promptly made and removal effected.

The medicinal treatment of these allied affections will be considered together at the close of the section.

PYELITIS.

Pyelitis and pyonephrosis are here considered together because of their intimate relationship, the latter being a resultant condition.

Definition.—Pyelitis is an inflammation, acute or chronic, of the mucous lining of the renal pelvis, resulting in the production of mucus, blood, pus, or *débris*, and subject to extension to surrounding parts.

Ætiology.—In general this condition is the result of two ætiological factors, obstruction, and extension of inflammation. This latter may be from a general pyæmia or a pre-existing perinephritis or suppurative nephritis. The former includes obstructions of whatever kind by which secretions are retained and become a source of irritation. Finally pyelitis may result from exposure to cold.

Pathology.—The pathological changes depend upon the stage of the inflammation and the cause to which it owes its origin. In the acute form there is congestion of the mucous membrane, with distension of the vessels and a mucous or muco-purulent secretion; or the surface may be suffused with blood. The mucous membrane is denuded of the epithelium in patches, constituting the catarrhal form;

or the epithelium may be thrown off in great quantity and the entire membrane subsequently share in the destruction. A rarer form is the croupous or diphtheritic, in which the mucous membrane is covered with yellow spots and the ureter subject to obstruction by the detachment of the false membranes.

If the inflammation has passed on to the chronic stage, the mucous membrane is found to be thickened, of a dark hue, and covered with ecchymotic stains. The pelvis of the kidney is filled with detritus or pus, and it is from this form that pyonephrosis may result by obstruction.

Pyelitis which arises from some temporary obstruction of the ureters may be suspected when there is lumbar pain, swelling at the seat of pain, and acid urine containing pus, pelvic epithelium, or calculous concretions. The diagnosis is confirmed by the sudden disappearance of the tumor with a free discharge of pus from the bladder and accompanying relief to the patient.

In case of permanent obstruction producing *pyonephrosis*, the following are the successive processes: urethral stricture; hypertrophy of the walls of the bladder with catarrhal inflammation and purulent degeneration of the mucous membrane, followed by extension of the purulent process through the ureters to the pelvis of the kidney and absorption of kidney-tissues through pressure, leaving finally only a sacculated pouch, which may discharge its contents into the abdominal cavity, or, by forming adhesions, discharge into the intestines or outwardly on the surface of the body in the lumbar region.

Symptomatology.—In pyelitis the symptoms vary with the stage and are both subjective and objective in character. In the early stage the pains are of a sharp, cutting variety, located in the renal region and extending from this point along the course of the urinary tract, and attended with more or less anxiety. The temperature is elevated and the patient is seized with recurring chills. The urine takes on a smoky hue, due to the presence of the suppurative products. Improvement sets in at this point or the disease passes on to the chronic stage. In this the pains are of a more dull, persistent character, the systemic derangement is more marked, with great debility and all the symptoms of a low-grade fever. The urine is heavy and dark, showing by its constituent elements a more extensive structural involvement.

A not uncommon complication of pyelitis is uræmia. In the early stages, with the suppression of the urine, uræmic symptoms may be developed and the patient die in a few days; or a more gradual train of typhoid symptoms may ensue, with delirium, convulsions, and coma. Uræmic poisoning is also incident to the chronic stage where the course is unusually protracted and the symptoms only indistinctly defined.

Diagnosis.—The diagnosis is seldom easy, and oftentimes cannot be clearly established. Careful attention to the physical constituents of the urine will aid greatly in determining the morbid state. The presence of the lamellar or very thin polygonal epithelial cells of the pelvis of the kidney and infundibula, which differ from the epithelial cells of other portions of the urinary tract, will aid in diagnosticating pyelitis.

There are three forms of renal disease most liable to be confounded with pyelitis, namely, cystitis, suppurative nephritis, and that form of kidney found in struma.

Cystitis is distinguished by localized pain in the region of the bladder, the absence of pelvic epithelium, and the frequent urging to urinate.

Suppurative nephritis is more easily distinguished by the character of the pains, the presence of renal casts, and the absence of pelvic epithelium, when uncomplicated.

In scrofulous kidney the distinctions are more difficult of recognition. The main guide is the general scrofulous cachexia found in this form. Both conditions may exist simultaneously, in which case the diagnosis is questionable.

Prognosis.—If the form is mild, a favorable prognosis may be given, dependent upon the nature of the cause; the mild form runs a short course. If it goes on to the chronic stage, the condition is more serious, especially when secondary to an enlarged prostate gland, extensive chronic cystitis, urethral stricture, and cancer of the kidney. It is very grave, but not necessarily fatal, when depending upon renal calculi and hydatids; the prognosis will be much influenced by the possibility of removing the calculi.

In pyonephrosis the prognosis depends upon the direction in which the pus is likely to be discharged. Rupture into the peritoneal cavity is rapidly fatal; when it is evacuated externally or into the intestines, recovery is possible from the gradual diminution and final cessation of the discharge. Oftentimes patients die of exhaustion from the long-continued drain on the system.

Treatment.—*General Management.*—For pyelitis it is necessary, first, to support the patient's strength, and, secondly, to render the urinary secretion as non-irritating as possible. For this purpose administer diluent drinks to correct extremes of acidity or alkalinity, and in the acute stage use may be made of local applications. (See treatment of Congestion.)

In pyonephrosis the tumor may be aspirated or cut down upon and drained through the loin, and the cyst-wall stitched to the edge of the incision. The fistula so formed is, at times, very slow in healing; but injections of a stimulating character, such as Iodine, Calendula, dilute Carbolic acid, etc., will be well borne and will materially hasten the cure. For this purpose we use Iodine all the way from Churchhill's to a one-tenth dilution, once or twice daily. We begin by using the dilute, throwing in from a drachm to an ounce, according to the capacity of the cyst, allowing it to drain off. When using the concentrated preparation of Churchhill, we throw in a drachm or half-drachm, and provide prompt drainage. Calendula should be used in a 20 per cent. dilution in distilled water; Carbolic acid 1 to 5 per cent. in distilled water. The removal of the kidney may be required in some cases, and should be done without hesitation; although a recent, it is an established and successful operation. For the operation itself we must refer the reader to the special literature of the subject, as little has as yet been incorporated in the general text-books on Surgery.

HYDRONEPHROSIS.

Synonym.—Dropsy of the kidneys.

Hydronephrosis is a condition allied to pyelitis, but sufficiently distinct to require separate treatment.

In this disease the primary and etymological significance shows it to be a blocking-up of urine in the pelvis of the kidney.

Definition.—Hydronephrosis is essentially a chronic disease of the kidneys in which, by a forced retention of urine, a process of dilatation is set up, resulting finally in the destruction of the organ.

Ætiology.—The obstructions necessary to produce this malady may arise in various ways, and may be classified as those exerting pressure from without and those acting within the lumen of the tubes.

One of the most common causes is a pressure on one of the ureters, induced by the presence of a tumor, as, for example, the uterine fibroid or carcinoma and any of the ovarian enlargements. The gravid uterus may be so tilted as to be the cause of injurious pressure and obstruction.

Those forces acting within the canal include, first, renal calculi; secondly, new growths; and thirdly, cicatricial contractions, the result of inflammation. Finally, it may be due to congenital stenosis or obliteration of the lumen.

Pathology.—The pathological changes are a direct result of pressure. At first, therefore, there is dilatation of the pelvis of the kidney. At this point, the fluid may be released and the process comes to an end. If not, a chronic condition ensues in which the pressure is steadily increased with the increasing volume of the contained fluid. The inevitable result of this prolonged tension is a progressive structural atrophy. The limit is reached when the entire substance of the kidney has been obliterated, leaving a sac distended with, usually, a clear fluid. A case of this kind came under the writer's notice in which the sac, besides the fluid, contained a quantity of calculous concretions.

In the early part of the chronic stage pus and mucus may be present, constituting a hydro-pyonephrosis, a condition frequently present.

Symptomatology.—Early in the case but few symptoms manifest themselves. Pain may be slight or entirely absent. As the distension becomes more marked, local pains and uneasiness appear; but there is no systemic disturbance, except when serious complications are present.

The enlarged kidney is soon felt as a fluctuating tumor in the lumbar region, and when several cysts are present it has a nodular feel. The colon, passing in front of the tumor, is subjected to pressure, and renders constipation a common symptom of this disorder.

The sudden removal of the obstructing agent results in a copious flow of urine.

Diagnosis.—Hydronephrosis is readily confounded with several other enlargements found in the abdomen. And first, with abdominal dropsy, especially when both kidneys are simultaneously affected. The history of the case, showing the progress of the growth, in connection with manual palpation will generally clear up the difficulty.

Second, with hydatid kidney. Here the diagnosis is difficult. The presence of the parasite in the urine, the history of the case, and the fact that but one kidney is usually affected in hydronephrosis, will exclude the hydatid form.

Ovarian tumors are distinguished by their history and by careful examination per vaginam and rectum.

Suppurative nephritis is easily recognized and excluded by its attendant constitutional symptoms.

Prognosis.—The gravity of this malady depends, first, upon chronicity; second, upon the accompanying complications; third, upon the fact of one or both kidneys being affected.

In general, the affection is a serious one; and this is especially true if both kidneys are affected, in which case the termination is invariably fatal. It is also fatal when depending upon the pressure of malignant growths. It is less serious when due to the presence of calculi.

In case one kidney remains sound, the functions are normally performed and the danger is not imminent.

Treatment.—*General Management.*—The patient's strength must be supported by a nourishing diet. The tumor is to be aspirated when fluctuation is made out or when distressing symptoms demand surgical relief. This simple method of relief should not be too long delayed. In case the obstruction does not give way within a reasonable time, an artificial outlet should be established in the lumbar region, or better, the kidney should be removed.

PERINEPHRITIS.

Perinephritis, as its etymology indicates, is an inflammation of the tissues immediately surrounding the kidney and involving also its investing membrane. The tissues undergo the various changes incident to an acute, followed by a chronic, inflammation with subsequent suppuration.

Ætiology.—Perinephritis finds its chief cause in a preceding pyelitis or suppurative nephritis. In the first case septic matter is conveyed from the renal pelvis by perforation to the surface of the kidney. In the second case there is an extension of inflammation by contiguity of structure. There may also be an extension from other adjacent organs or tissues. Perinephritis is frequently caused by external violence resulting in wounds or contusions; and not unfrequently it follows an exposure to extremes of heat and cold.

Pathology.—The cellular tissue surrounding the kidney first takes on active congestion with engorgement of the vessels. This is followed by an exudation of lymph, with infiltration, organization, and solidification. The solidified tissue breaks down *en masse* or at various points. The pus formed is generally of an offensive character.

Surrounding organs may share in the suppurative process and the abscess grow to enormous proportions, sufficient in some cases to displace the liver and encroach upon the thoracic cavity.

The pus finds exit by perforation into the ureters; by the same process into the colon, and sometimes, burrowing outward, comes to the surface through the abdominal parietes; more rarely it penetrates through the diaphragm and into the thoracic cavity.

The suppuration may go on to gangrene with extensive areas of sloughing; or if the reparative process sets in, the inflammatory products are in part eliminated, leaving a large sclerosed mass *in loco*.

Aside from the febrile changes, the urine remains unaffected, unless pyelitis or suppurative nephritis be present.

Symptomatology.—The following are a few of the more important symptoms in the order of their occurrence. High fever, chills and rigors, flushes of heat, anxiety and local pain. The pulse is full and strong in the sthenic form, or it may be rapid and weak. These symptoms go on to a typhoid condition, with hot, dry skin, thickly furred tongue, anorexia and constipation, due in part to the mechanical pressure of the tumor. In short, we have all the symptoms of a suppurative fever, with the prostration and colliquative sweats in the later stages.

The tumor is readily located as a large hard mass in the lumbar region and closely identified with the kidney. The hardness is an early symptom and disappears with the advent of suppuration. The skin surface is more or less œdematous and discolored.

The above symptoms are comprised mainly in the acute attack. The disease may come on slowly, without at first arresting attention, and run a chronic course. Or the process may stop short of suppuration with complete or partial restoration.

The gravity of the termination, as well as the character of the symptoms, depends greatly upon the channel through which the pus is evacuated.

If effusion takes place into the peritoneum, a serious and probably fatal peritonitis is set up. Or, finally, death may result from blood-poisoning, consequent upon the absorption of septic matters into the blood.

Diagnosis.—Perinephritis is readily distinguished from other forms of kidney disease by the character of the enlargement and by the nature and severity of the constitutional symptoms. This forms the chief distinction from suppurative nephritis, in which the constitutional symptoms are similar, but of a milder type, and the local appearances somewhat different, lacking the œdema and discoloration.

In hydronephrosis we have a movable tumor of decidedly different feel, and no infiltration of surrounding tissues.

Other new growths in the abdomen, as tumors of the spleen or liver, are excluded by palpation and the character of the constitutional symptoms; or if cancerous, by the cachexia.

Prognosis.—The majority of cases go on to a fatal termination, the symptoms becoming more alarming as the case progresses.

The course of an ordinary case is comparatively short, ranging from two to four weeks. The chronic form runs a longer course, ordinarily extending over a period of three or four months.

Recovery may take place if the pus finds vent externally, or internally through the bladder or colon.

General Management.—In the early stage treatment must be directed to overcome the febrile conditions, both by local means, the use of a non-stimulating diet and internal medication. When the patient's strength is reduced through the debilitating effect of suppuration, a nourishing diet is called for. When fluctuation is made out, the contained matter is to be drawn off by the aspirator, if possible. If large curdy masses are present, they must be cut down upon and removed; in this case the cavity should be thoroughly cleansed with antiseptic lotions, and good drainage established.

THERAPEUTICS OF NEPHRITIS.

The following remedies comprise the medical treatment for the diseases considered under the chapter Nephritis.

Aconite.—Of great service in the stage of congestion and engorgement, as also when fever and acute inflammatory symptoms supervene. There is difficult, painful, and profuse urination. When the exciting cause is a chill or sudden suppression of perspiration it is well indicated. It may be mentioned as a matter of personal experience that when Aconite fails in apparently suitable cases, Sulphur will act most promptly.

Apis mel.—After scarlatina or diphtheria. Urine high-colored, with brick-dust sediment.

Arsenicum.—Urine turbid, cloudy, mixed with pus and blood; albuminuria;

strangury and burning. In low, prostrating conditions with septic processes. When the result of extensive burns. The dry mouth and thirst of Arsenic must also be present. In this connection we would suggest the use of Arsenic-hydrogen when there is much blood in the urine; and when septic symptoms are marked, *i. e.*, recurring chills, fever, etc., the exhibition of Chininum ars. We have used the 3d trituration with gratifying results.

Belladonna.—Sharp, paroxysmal pains from the kidneys to the bladder Urine high-colored, scanty, with anxiety and restlessness; pericardial aggravation and colicky pains. Sudden and complete suppression of urine with cerebral symptoms. In acute nephritis, when uræmic symptoms appear early in the disease. Steady high temperature. Urine contains a cloudy deposit (phosphates?).

Berberis.—Is indicated when the following symptoms appear: Tearing, pulsating pain in right kidney extending into the bladder. Cutting pain from left kidney into bladder and urethra. Urine dark or bright yellow, with copious slimy sediment. Urine deposits thick mucus or has a bright-red, mealy sediment.

Cantharides.—Acts upon the mucous membrane of the entire urinary tract, producing violent inflammation from the kidneys to the urethra. Lancinating, tearing pains in the renal region, extending down the ureters and up into the lumbar region. Pains are aggravated by motion, and often become agonizing; appear suddenly, with momentary arrest of breathing. Urination is excessively painful, so that only a few drops can be expelled at a time; urine mixed with blood. Albuminous urine with cylindrical casts. Deposits granular, grayish-white, like fragments of mortar. Pains extend through the penis, and are accompanied by priapism, or, in women, we may have a painful aching along the urethra with local irritability and temporary relief from pressure or friction. Fever high, and accompanied with full, hard, and quick pulse, flushing of the face, thirst and loss of appetite. General restlessness or sleeplessness on account of the severity of the pains and the frequent desire to urinate. The patient has a pinched and pained expression. The remedy is applicable to the first stage of nephritis, and is in many respects a companion of Belladonna.

Chelidonium.—Violent paroxysms of pain in the lumbar region, with intense headache, vertigo, and syncope. Urine turbid, red, with small gravel and fibrinous deposits.

Ferrum phosphoricum.—Is entitled to rank with Aconite, Belladonna, etc., in its power to control fevers. Effective in violent congestions. Urine has a profuse mucous sediment; blood-red, and charged with blood-corpuscles.

Hepar sulph.—This remedy is of service when the purulent discharge becomes profuse. Also when there is an apparent paralysis of the bladder, the urine escaping slowly, or when it is voided with difficulty, the last part of the urinary discharge being of a bloody color. Whitish urine having a whitish sediment and with a fatty pellicle upon the surface.

Mercurius.—This remedy has rendered good service in nephritis, and follows very closely upon Aconite or Belladonna when neither of them is able to control promptly the initial symptoms. Among the conditions which call for this remedy we find diminished secretion of urine with frequent ineffectual urging. Urine dark-colored, cloudy, with strong smell, purulent, mixed with blood, and having a whitish, flocculent, shreddy sediment. The lumbar pains are dull, and the fever less marked than under Aconite or Belladonna. Gastric disturbances are present in varying degrees of intensity. Chilliness, flushes of heat, and disposition to diaphoresis. In the exhibition of Mercury, the solubilis is preferred for the milder forms and the corrosive sublimate for the more aggravated cases, *i. e.*, the pains are more severe, the urine more scant and bloody, and the dyspnœa more marked in degree.

Nitrum.—Chronic nephritis with traces of blood in the urine. Urine frequent, pale and turbid, or with a bloody tinge, depositing a thick white or mucous sediment. Renal region painful, with impeded urination. Extreme depression of the general system may also be present.

Phosphorus.—Urine scanty, with frequent desire to urinate. Urine dark-colored or depositing a whitish sediment. Purulent urine, associated with general wasting away of the tissues. Lung complications.

Terebinthina.—Scanty secretion of dark or bloody urine containing albumin. Strangury. Urine sometimes clear; at others, contains mucus or deposits a thick, muddy sediment.

The following remedies may be of service and should be carefully studied: *Arnica*, *Benzoic acid*, *Cannabis*, *Chimaphilla*, *Clematis*, *Colocynthis*, *Copaiba*, *Cubebs*, *Erigeron*, *Eupatorium*, *Mezereum*, *Nux vomica*, *Petroleum*, *Pulsatilla*, *Rhus tox.*, *Sabadilla*, *Senecio*, *Sulphur*, *Veratrum album*, *Veratrum viride*.

ALBUMINURIA.

Synonyms.—Albuminous urine.

The term albuminuria has been used as synonymous with Bright's disease, but we do well to adhere to its literal signification—albuminous urine—and to regard the condition as simply symptomatic, yet a symptom of such rank as to arrest immediate and serious attention. Regarding it thus, we devote some space to its special consideration.

Albumin appears in the urine under a variety of circumstances, and even in normal urine. When it is transient and due to an excessive use of an albuminous diet or to temporary dietetic errors, its presence fails of significance; but in the majority of cases, albumin in the urine indicates serious renal malady and the existence of congestion or inflammation.

When such symptoms as the following occur, or any considerable number of them, immediate examination of the urine should be made: viz., deranged digestion, manifested by flatulence, acidity, nausea, torpidity of bowels, etc.; nervous exhaustion as shown by lassitude, muscular weakness, aching back and headaches, together with palpitations, wakefulness, and frequent nocturnal micturition; these, with dry skin, pasty, pallid complexion, and œdema of the eyelids, ankles, and backs of hands, all give evidence of impaired blood-structure from loss of albumin.

The urine is, of course, promptly examined on the appearance of any of the acute forms of kidney disease.

Albumin may appear from a cutaneous excitement depending proximately upon a disturbance of vaso-motor innervation in some diseases of the nervous system or brain; in febrile or inflammatory diseases; from obstructions to the proper flow of blood, as in cardiac or pulmonary diseases; in pregnancy or puerperal states; in acute and chronic Bright's disease of the kidneys; in lead-poisoning, from irritant poisons; in scurvy, syphilis, suppuration, or changes in the blood.

When albumin appears in the urine, the most important point to be considered is whether, or not, it is associated with organic changes in the kidneys. To determine this we must consider the duration of the albuminuria, the quantity of albumin, and its association with structural *débris* of the kidneys; and finally, the presence or absence of any disease, except in the kidneys, which will account for the albuminuria. Brunton makes the point that there are but two kinds of albuminuria, the true and the false. The first is due to some alteration in the kidney itself or the circulation through it, by which the serum-albumin of the blood is thrown off continually. The latter is due to the passage through the kidney of albuminous substances, not serum-albumin, and without kidney change. The excretion is not continuous. It may be assumed that the greater the quantity of albumin, the more probable is its dependence upon renal disease. The quantity of urine discharged during twenty-four hours should always be considered, since a portion of the urine examined might be only slightly albuminous, yet the total waste be considerable, on account of the abundant discharge of urine during the day.

We may suspect Bright's disease of the kidney when we find a free discharge of pale urine, containing more or less albumin, daily. But when the urine is heavy, high-colored, and but slightly albuminous, we may look for a pyrexial state or to some obstruction to the circulation of the blood. As a diagnostic point, "the assertion that incidental albuminuria can be distinguished from a similar condition due to renal disease, from the fact that certain odorous or pigmentary substances, when taken internally, will appear in the urine in the former case, but not in the latter, does not seem to be sustained by recent experiments."

Increased vascular tension and the increased rapidity of the circulation in the glomeruli have been assigned as causes of albuminuria. Others have claimed that in the majority of cases the pressure is either diminished or that the increased pressure is due to obstructions in the circulation, in both cases producing diminished rapidity and retention of blood in the renal capillaries.

From experiments on albuminuria occurring in health, Chateaubourg concludes as follows:*

1. Albumin is found in the urine of the majority of healthy persons more or less abundantly, and is transient in its character.
2. Rest in bed has a clearly marked influence in diminishing the amount of albumin excreted.
3. Bodily fatigue greatly influences the production of physiological and transient albuminuria.
4. Intellectual labor augments with most people the amount of albumin.
5. Cold bathing exerts considerable influence in increasing physiological albuminuria.
6. Sexual excitement and menstruation manifestly affect albuminuria in the healthy.
7. Albuminuria is as frequent in children as in adults, but the quantity excreted is less.

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* Millard's "Bright's Disease."

8. Digestion, if accompanied by rest, does not exert much influence upon physiological albuminuria.

The writer is of the opinion that all of these points have been abundantly confirmed.

Tests for Albumin.—There are several methods for testing the presence of albumin, that by heat and Nitric acid being the most important.

After testing the urine for its reaction, place a small portion of the urine in a test-tube and hold over a spirit lamp, heating the upper portion of the fluid. If albumin is present, the upper portion of the urine becomes turbid, while that in the bottom of the tube remains clear. The turbidity may be due to the neutral or the alkaline reaction of the urine and the presence of phosphates; but if so, the addition of a few drops of Nitric acid causes them to disappear. It must be remembered that albumin is not precipitated by heat unless the urine has an acid reaction; in such cases a few drops of Acetic acid will have to be added to the urine before heat is applied. If albumin is present in large quantities, it is rapidly precipitated; but if the quantity is small, the coagulation may not appear until the urine has been allowed to settle and cool.

Again, partly fill a tube with the urine, and holding it at an incline, allow Nitric acid to run slowly along the sides of the tube to the bottom. When this is carefully done we will have three layers in the tube, provided the urine is albuminous: at the bottom there will be the colorless acid; next above, a cloudy deposit due to the coagulated albumin, and on the top, the clear urine.

Nitric acid may precipitate amorphous urates. To determine the turbidity due to albumin or the urates, we must remember that in the former the turbidity begins immediately over the layer of Nitric acid and spreads upwards, while that due to the presence of the urates begins at the surface of the fluid and spreads downwards. Heat dissolves the urates, while it increases the coagulation of the albumin. We see, then, that these two tests are mutually complementary, and therefore should be used together when testing urine for albumin.

In addition to these tests we have the brine-test of Roberts and the following reagents: Picric acid, the double Iodide of mercury and potassium, the Sodium tungstate. Some of these chemicals have been used by Dr. Oliver in preparing test-papers for use at the bedside, which have been found very satisfactory.*

Other substances possess the power of coagulating albumin, such as Alcohol, Alum, Bichlor. of mercury, Ferrocy. of potash, Sulphate of copper, and Kreasote; but they are not satisfactory, because they precipitate with the albumin some of the natural constituents of the urine. To obtain the amount of albumin present, the following process may be followed: "Acidulate a measured quantity of urine with Acetic acid, placing it in a Florentine flask, and heating this in a water-bath until the temperature of the fluid has risen to 194° F., or until it boils. The coagula that form are then carefully collected on a filter of ascertained weight, washed, dried, and weighed."

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* Millard's "Bright's Disease," page 58.

Treatment.—The treatment of albuminuria will be given in connection with Bright's diseases.

BRIGHT'S DISEASES.

Divisions.—Tubal nephritis, Cirrhotic kidney, Lardaceous kidney.

Synonyms.—(1.) Large smooth kidney, Large white kidney, Parenchymatous nephritis, Acute diffuse nephritis, Acute desquamative nephritis, Croupous nephritis, Inflammatory dropsy.

(2.) Granular kidney, Atrophic nodular or gouty kidney, Chronic albuminuria, Non-desquamative nephritis.

(3.) Waxy kidney, Amyloid kidney.

Adopting the anatomical basis of classification, we find three forms of kidney affections which are gathered under the name of Bright's disease, viz.: the tubal or diffuse, extending later perhaps to the stroma; the granular or cirrhotic, affecting the intertubal or fibrous structure of the kidney; and third, the amyloid or lardaceous, affecting the bloodvessels. This division of the subject is not arbitrary, nor is it alone anatomically correct, but clinically it is found to hold equally good.

The first two are primarily and essentially kidney diseases, while the third is secondary and merely shares in a general systemic disorder. We necessarily consider these three forms separately in order to reach a correct understanding of the disease. It must be remembered, however, that various forms of Bright's disease are often found in combination, and that in this respect each case is a law unto itself. The three typical forms are here given, but in practice it may be necessary to consider the individual case in the light of a combined knowledge of the three.

General Definition.—Bright's diseases include those acute or chronic diseases of the kidneys characterized by albuminous urine containing tube-casts, accompanied with general dropsy and a degeneration of the structure of the kidneys.

TUBAL NEPHRITIS.

Definition.—An acute or chronic disease affecting primarily the uriniferous tubules, and associated with fever, dropsical effusions, local pains, albuminous or bloody urine, and tube-casts.

Ætiology.—The most common exciting cause is an exposure to cold or to sudden changes of temperature, such as occurs among bakers, firemen, laborers, and all those whose occupations call for active exertion in the open air. In these cases the sudden checking of the perspiration reäcts injuriously upon the kidneys through the sympatheticus in its connection with the surface of the body. Even when not overheated, the exposure of the body to extreme cold or to sudden chilling sets up violent internal congestion, or, by causing a defective action of the skin, throws an excess of labor upon the kidneys in the elimination of excrementitious matters from the blood. It may follow an attack of scarlatina, diphtheria, erysipelas, measles, or pyæmia, thus showing its dependence upon certain forms of blood-poisoning; however, in epidemics of scarlatina or diphtheria the frequency and gravity of the attack does not depend upon the virulence of the epidemic type. Pregnancy, the use of irritant drugs, and alcoholism are also potent causes.

The chronic form results by progression from the acute inflammation, and is not secondary to cardiac or pulmonary derangements, as was at first supposed. In general, Bright's disease occurs more frequently among men than among women, and in those of middle age rather than in the very young or old (except in the former case, when due to the exanthemata).

Pathology.—In tubal or inflammatory nephritis two distinct stages are recognized, the *acute* and *chronic*. In the acute stage the conditions are those of an active congestion and engorgement; the kidney is enlarged, sometimes to twice its normal size, the capsule smooth, shiny, more or less deeply injected, and in some cases marked with extravasations; or the surface may be perfectly white despite the internal congestion; the capsule remains non-adherent, and its tissue of normal tenuity. On section, the exposed surfaces may bleed freely or drip with blood; which being removed, the Malpighian bodies are seen to stand out as bright-red spots on a dark or chocolate-colored ground; the pelvis is found to be more or less congested. The increased size of the kidney is mainly due to enlargement of the cortical substance; the cones are but little affected in comparison, being simply congested. The above are the gross appearances; the microscope shows the cortical tubules to be highly congested and filled with almost opaque masses of proliferated cells, blood-corpuscles unchanged, and a species of *débris*, the probable product of broken-down epithelial cells and constituting the state of cloudy swelling; the accumulation is greatest in the convoluted tubules, owing to the difficulty of evacuation; the Malpighian vessels are found to be distended with blood, to which fact is due their prominence on section; the intertubular tissue is as yet unaffected. The relative quantity of epithelium and blood present depends largely upon the nature of the efficient cause. In the congestion following exposure, the corpuscles are found to predominate, while the epithelial cells are notably in excess when the process is secondary to one of the exanthemata.

At this stage, one of three events ensues: death from extensive or complete plugging-up of the tubules, resolution followed by complete recovery, or progression to the second or chronic stage.

In the chronic inflammatory stage of Bright's disease, there are three more or less distinctly marked conditions depending upon chronicity; the first includes two forms, the large white kidney and the large mottled kidney. The large white kidney results from the acute form by the gradual diminution of the congestion while the exudative process continues; and for this reason the kidney becomes progressively whiter; other than this, there is no noticeable difference from the acute form; the inflammation is still confined to the tubes; the capsule is non-adherent.

The large mottled kidney is classed with the large smooth kidney, because it is associated with it in point of time as well as in the general progress of pathological change; the inflammation is confined to the tubes as before, and the capsule non-adherent; in both forms the surface is perfectly smooth. In the large mottled kidney we have a condition due to fatty degeneration of the renal epithelium. Extravasations are rarely present, but the surface is marked with yellowish blotches due to the deposition of sebaceous matter. A section of the kidney shows an increase of cortical substance, but an absence of congestion. The tubules contain dark masses of epithelial cells which have undergone fatty change; the engorgement of this substance may be so dense in parts as to cause an exudation of oily matter on section. The fatty degeneration may appear within a week or two of the acute attack, may run a short course, or be prolonged for years.

The second stage of the chronic form shows a continuation of the process found in the large white kidney; there is now a complication of the interstitial tissue consisting of a hyperplasia and a nucleation. The kidney is large and white as before, but has slight depressions disposed over its surface; as the disease advances, these depressions become more marked. The capsule is non-adherent. A section of the kidney at this time shows a paler condition of the cortex, owing to the packing of opaque cells about the vessels, but the cones remain unchanged in appearance unless the same process has extended to these structures. The microscope shows an intertubal exudation with nuclear formations in the stroma.

[The term chronic, as applied to the two preceding forms, is used only in a relative sense; as a rule, the course of each is comparatively short.]

The third stage is the stage of atrophy. It is comparatively rare, for the reason that the disease terminates fatally or favorably before this point is reached. Its appearance is very late as compared with fest themselves. Pain may be slight or entirely absent. As the distension becomes more marked, local pains and uneasiness appear; but there is no systemic disturbance, except when serious complications are present.

The enlarged kidney is soon felt as a fluctuating tumor in the lumbar region, and when several cysts are present it has a nodular feel. The colon, passing in front of the tumor, is subjected to pressure, and renders constipation a common symptom of this disorder.

The sudden removal of the obstructing agent results in a copious flow of urine.

Diagnosis.—Hydronephrosis is readily confounded with several other enlargements found in the abdomen. And first, with abdominal dropsy, especially when both kidneys are simultaneously affected. The history of the case, showing the progress of the growth, in connection with manual palpation will generally clear up the difficulty.

Second, with hydatid kidney. Here the diagnosis is difficult. The presence of the parasite in the urine, the history of the case, and the fact that but one kidney is usually affected in hydronephrosis, will exclude the hydatid form.

Ovarian tumors are distinguished by their history and by careful examination per vaginam and rectum.

Suppurative nephritis is easily recognized and excluded by its attendant constitutional symptoms.

Prognosis.—The gravity of this malady depends, first, upon chronicity; second, upon the accompanying complications; third, upon the fact of one or both kidneys being affected.

In general, the affection is a serious one; and this is especially true if both kidneys are affected, in which case the termination is invariably fatal. It is also fatal when depending upon the pressure of malignant growths. It is less serious when due to the presence of calculi.

In case one kidney remains sound, the functions are normally performed and the danger is not imminent.

Treatment.—*General Management.*—The patient's strength must be supported by a nourishing diet. The tumor is to be aspirated when fluctuation is made out or when distressing symptoms demand surgical relief. This simple method of relief should not be too long delayed. In case the obstruction does not give way within a reasonable time, an artificial outlet should be established in the lumbar region, or better, the kidney should be removed.

PERINEPHRITIS.

Perinephritis, as its etymology indicates, is an inflammation of the tissues immediately surrounding the kidney and involving also its investing membrane. The tissues undergo the various changes incident to an acute, followed by a chronic, inflammation with subsequent suppuration.

Ætiology.—Perinephritis finds its chief cause in a preceding pyelitis or suppurative nephritis. In the first case septic matter is conveyed from the renal pelvis by perforation to the surface of the kidney. In the second case there is an extension of inflammation by contiguity of structure. There may also be an extension from other adjacent organs or tissues. Perinephritis is frequently caused by external violence resulting in wounds or contusions; and not unfrequently it follows an exposure to extremes of heat and cold.

Pathology.—The cellular tissue surrounding the kidney first takes on active congestion with engorgement of the vessels. This is followed by an exudation of lymph, with infiltration, organization, and solidification. The solidified tissue breaks down *en masse* or at various points. The pus formed is generally of an offensive character.

Surrounding organs may share in the suppurative process and the abscess grow to enormous proportions, sufficient in some cases to displace the liver and encroach upon the thoracic cavity.

The pus finds exit by perforation into the ureters; by the same process into the colon, and sometimes, burrowing outward, comes to the surface through the abdominal parietes; more rarely it penetrates through the diaphragm and into the thoracic cavity.

The suppuration may go on to gangrene with extensive areas of sloughing; or if the reparative process sets in, the inflammatory products are in part eliminated, leaving a large sclerosed mass *in loco*.

Aside from the febrile changes, the urine remains unaffected, unless pyelitis or suppurative nephritis be present.

Symptomatology.—The following are a few of the more important symptoms in the order of their occurrence. High fever, chills and rigors, flushes of heat, anxiety and local pain. The pulse is full and strong in the sthenic form, or it may be rapid and weak. These symptoms go on to a typhoid condition, with hot, dry skin, thickly furred tongue, anorexia and constipation, due in part to the mechanical pressure of the tumor. In short, we have all the symptoms of a suppurative fever, with the prostration and colliquative sweats in the later stages.

The tumor is readily located as a large hard mass in the lumbar region and closely identified with the kidney. The hardness is an early symptom and disappears with the advent of suppuration. The skin surface is more or less œdematous and discolored.

The above symptoms are comprised mainly in the acute attack. The disease may come on slowly, without at first arresting attention, and run a chronic course. Or the process may stop short of suppuration with complete or partial restoration.

The gravity of the termination, as well as the character of the symp-

The urine offers a decisive test in all cases of doubt; in hæmatinuria the urea is found to be in excess, and there is an almost entire absence of blood-corpuscles, the deep-red color being due to the deposition of granular blood-pigment.

Prognosis.—In tubal nephritis the prognosis is more favorable than in the succeeding forms, but is still sufficiently grave. Death occurs earlier than in these forms, because of the violence of the symptoms and the suddenness of the onset; but this is the very stage in which the prognosis is most favorable; its gravity increases *pari passu* with the advance of the disease toward the chronic forms. Recovery may take place in the second stage by well-directed treatment, but rarely or never in the third stage.

General Management.—In acute tubal nephritis the local pains and systemic disturbance are such as to pointedly call for relief. The patient is put to bed at once, kept warm, and rest of body and mind enjoined. It has been observed that in many cases the amount of albumin is in direct proportion to the exercise taken, and the writer has known of at least one case in which albumin *only* appeared after exercise.

Every effort should be made to increase the activity of the skin, promote the elimination of urea, and by the use of diluents render its action less irritating.

The body should be sponged daily, taking proper precautions to prevent the suppression of perspiration. To sponge the body, use warm water to which has been added Bicarbonate of soda, a teaspoonful to the quart. When the skin is persistently dry and feverish, the wet pack is most useful. The patient should be kept in the wet sheet enveloped in flannel for a period varying from one to four hours.

The skim-milk diet should be strongly urged, and the free use of hot water as a drink, many times a day, should be encouraged; weak tea or tea of flaxseed may be taken freely. Next to skim-milk a vegetable diet should be prescribed; very little meat is to be eaten in the early weeks of this disease.

The practice of eating lemons filled with sugar is very reprehensible (in any case), but well-diluted lemon-juice or oranges are generally grateful and well borne.

As the case passes over into the more chronic form, a more nutritious diet may be necessary, *i. e.*, meat or eggs once a day, and strengthening broths.

After the acute stage has passed away, the patient should seek gentle exercise in the open air, especially in warm climates. Various mineral waters here come into use, principally the Bethesda, and such pure waters as the Bailey springs. The kidneys are thus washed out and the tubules cleansed of obstructing *débris*. When it can be borne, woollen should always be worn next the skin. In all forms of Bright's disease the use of light flannel night-clothing should be particularly recommended; it is a grave error to replace the warm woollen underclothing worn during the day by cotton or linen night-clothing.

The homœopathically indicated remedies act with most gratifying promptness in tubal nephritis, especially the acute form.

The indications for this and other forms of Bright's disease are given conjointly at the close of the chapter.

CIRRHOSIS RENALIS.

Definition.—Cirrhosis, or granular kidney, is a chronic form of Bright's disease, characterized by a slow and insidious invasion and a protracted and somewhat masked course.

Ætiology.—There would be no strain in the use of terms to broadly classify the ætiology of cirrhotic kidney under three heads: *habit, habits,* and *occupation.* The first refers to the diathesis known as gouty. A large proportion of the victims of cirrhosis are found to be subjects of inherited or acquired gout; hence also, heredity is an important contributing factor. The second head "habits" is necessarily associated with the first; by it is meant the prolonged and excessive use of alcoholic liquors, and all those forms of indulgence known by the term "high living." The third, "occupation," is important; it refers to those who by their daily avocations are constantly brought in contact with some mineral poison, notably lead. Statistics show that a large proportion of painters and plumbers eventually fall under this disease; hence plumbumism or lead-poisoning, in point of frequency, is second only to gout or the gouty diathesis. Pure alcoholism as a cause is undoubtedly overrated. Heart and lung affections were formerly included in the list of causes, but are now regarded as complications.

The frequent retention of urine, pregnancy and depressing emotions are worthy of notice. But notwithstanding the importance of the above causes, there are many cases which cannot be traced to either of them or to any other, and whose ætiology must remain a matter of doubt.

Pathology.—The tissue primarily involved is the stroma—subsequently the tubules and vessels.

Owing to the prolonged and somewhat hidden course of the disease, it is a matter of some difficulty to associate the anatomical lesion with the corresponding stage in the progress of the disease. Also, as the disease is not fatal in the early stages, few opportunities are given for the study of pathological conditions.

The kidney is at first of normal size, but presents irregularities of surface and, in some cases, small cystic growths. The capsule is removable, but with some difficulty. There is therefore in the early stage scarcely a noticeable change in the appearance of the kidney, except the slight roughness. Laying open the kidney, a somewhat enlarged cortex is found, due to increase in the fibrous stroma, and not to any changes in the tubes or vessels. The first changes in appearance and structure begin from the surface, with gradual encroachment on the tubes. With these conditions there is as yet no abnormality in the renal secretion and no appearance of œdema.

As the process continues, further changes are to be noted; the volume is gradually reduced, owing to condensation of structure; the weight may remain unchanged and be increased. The surface is more irregular, and is thickly strewn with what looks like large, pale granulations; between these the surface is slightly reddened, due to hyperæmia. Cysts are numerous. A section made at this stage shows the cortex to be the part most affected, and more especially about the circumference where the changes first originate. The cortical substance lying between the cones may be almost obliterated. The color is light or yellowish (when in connection with pronounced heart affections it is redder). The structure is more dense, and has a rough, granular feel; cysts are found distributed throughout.

The minute anatomy is as follows: fibrous hyperplasia, especially dense about the Malpighian vessels. The tubes are subjected to pressure by the increased stroma, and are more or less occluded by the granular degeneration of the lining epithelial cells and by the organization of a fibrinous exudate. The cones are but little affected. The walls of the bloodvessels become thickened and atheromatous, a condition which soon becomes general in the system. As a result, we have left ventricular hypertrophy and various lesions in the eye and brain. Hæmorrhage first takes place in the fibrous layer of the retinal arteries, and subsequently fatty degeneration ensues, with the formation of a ring of white spots about the disk.

The retinal lesions may appear early, even before any form of Bright's is suspected; or it may appear late as a troublesome complication. In some cases the eye remains unaffected throughout.

Serious pathological changes in the cerebral vessels appear late, but are almost invariably present; the weakened vessels with their contracted lumen give way under the increased blood-pressure and cause extravasation and cerebral hæmorrhage, according to their size. These conditions account for the very frequent appearance of cerebral symptoms in the later stages of cirrhosis.

Symptomatology.—Cirrhotic kidney is a disease which has, in general, the peculiarity of running an almost latent course throughout, and only manifesting its prominent symptoms toward the last.

The invasion and early stages are so thoroughly obscure that, as a rule, neither patient nor attendant is aware of the process. According to Dickinson, "it is impossible to recognize the disorder until it has reached what is really an advanced stage." And so the subject of this disease seldom applies for relief until it is too late; however, it is a question whether the disease is curable in any but the very early stages.

The patient applies for aid when some troublesome symptom makes its appearance, such as weak vision, headache, gastric disturbances, diarrhœa, or bronchitis, asthmatic symptoms, and other irregularities in the respiratory system; in almost every case there is a marked degree of hypochondriasis. It will then be noticed that the patient has a pallid cachectic look and is ill-nourished; there are no dropsical symptoms, except, perhaps, a slight œdema about the eyes. The conjunctiva is found to be œdematous, which explains, in part, the weak vision. The above condition is reached after a long period of ill health in which dyspeptic symptoms have predominated. The only symptom referred to the urinary organs will probably be that the secretion is a little more free than natural, with the troublesome necessity for frequent nocturnal micturition. It is during this period that albumin makes its appearance in the urine in small but ever-increasing quantity, and is seldom sought for. The urea is excreted in diminished quantity, and the specific gravity is below the normal.

In the vascular system a series of important changes (referred to in the pathology of this form) are taking place, and cause most serious symptoms in the later stages. These consist in hæmorrhages from, and in, various parts of the body due to over-tension in atheromatous vessels; epistaxis is one of the most constant and troublesome of these; hæmorrhage in cerebral vessels is a common cause of death.

In the later stages of the disease the urine is noticeably increased in quantity, a characteristic symptom, and cerebral symptoms make their appearance, such as convulsions and coma; these are due either to the above-described vascular changes or to the poisonous effects of retained urea. Death results from uræmia or from one or more of the attendant complications, notably in the heart and lungs.

Diagnosis.—The manifestations of the cirrhotic kidney are essentially different from those of the tubal or lardaceous, hence there is but slight possibility of confusion, except in case of the mixed forms. The great difficulty for the practitioner is to recognize the disease in its early stages. Hence the necessity for an early examination of the urine in all doubtful cases, especially in those attended with polyuria and the frequent calls for micturition at night.

Prognosis.—Ultimately this disease is always fatal. It is only a matter of time when the disease has once become thoroughly established; but as it is a matter of quite a long time, early death is not to be looked for when the disease is discovered in the early stages.

Although the disease usually consumes many years in its progress, after the appearance of the prominent symptoms its course is measured by only a few weeks or months.

General Management.—If the practitioner could assume the management of this form of the disease at an early stage, he would probably address himself to its treatment with a more confident air. But, as already intimated, neither patient nor practitioner is apt to distinguish the various gastric symptoms, nocturnal micturitions, slightly defective vision, appearance of œdema, etc., which portend granular kidney, from the thousands of cases of a similar sort that never amount to anything more than a "bilious attack."

Such being the fact, we stumble upon cirrhotic kidney, in the majority of cases, in a stage of development when complete recovery is scarcely to be hoped for. Like some forms of pulmonary phthisis, while a cure is quite impossible, a comparatively comfortable existence may be maintained for months or even years.

Under favorable and favoring auspices there are cases which have not advanced to complete disablement of both kidneys, where our remedies do most excellent work in arresting the disease. In almost every case the distressing complications may be relieved or alleviated by the homœopathically indicated remedy.

In the general management of these cases, clothing and climate are to be regarded as of first importance. Flannel should be worn next the skin day and *night.* Night-clothing of a light flannel must be regarded as essential to safety. The skin must be kept warm and active at all hazards. Bathing with warm water and soap or bicarbonate of soda. When the patient is liable to take cold, or reaction is tardy, the bath should be followed with lively friction and the use of cocoa butter, olive oil, or vaseline. J. Gibbs Blake recommends "shampooing downwards for dropsy of the limbs and chest," but as the absorbents carry from the circumference to the centre, it will probably be found that the reverse is better. The wet-pack, keeping the patient in the sheets one, two, or three hours, and repeated once or twice weekly, will tend to relieve the disabled kidneys. The vapor or hot-air bath will prove useful in many cases; the Turkish bath, when easily obtainable, can be resorted to with advantage, two or three times a week.

In all cases the determining cause of the disease must be taken into consideration; if from lead-poisoning, a change of occupation is required; if from gout or alcoholism, a strict adherence to temperance in both food and drink.

Climate has a very decided influence on the progress or arrest of the disease. In the whole catalogue of disease, none, not even phthisis, is more influenced by cold and changeable weather than Bright's. An atmosphere should be sought that is mild and dry, a soil that is light and sandy. The patient should be as much as possible in the open air; gentle exercise in the open air may be said to be the *sine qua non;* and it should be kept up as long as possible, and actively enough to promote free perspiration.

In the United States, where we may have almost any desired climate and soil within reach by rail in a few hours' ride, we have the best possible facilities for climatic treatment. Favorable conditions are found in many parts of North and South Carolina, Georgia, and Florida. In Florida the atmosphere is not so dry as might be desired, but the climate is so mild that open-air exercise is seldom interfered with. Probably Southern Georgia, with its dry sandy soil, dry atmosphere and mild climate, offers better inducements than any other location. The atmosphere of the Texas table-lands has the advantage over that of Florida in being dry, and is also warm enough to allow of constant out-door exercise without the liability to catarrhal attacks, a great desideratum in the treatment of Bright's, reducing to the minimum the danger from bronchitis, a most serious complication.

Santa Fé, New Mexico, which is situated on an elevated plateau, about seven thousand feet above the sea-level, affords a delightful summer temperature and is within easy reach of a warmer atmosphere during winter.

The great advantage possessed by California is the singular equability of its temperature. The country around San Francisco and especially the high table-lands are to be preferred for their mild bracing atmosphere; the days are warm and pleasant, suitable for open-air exercise, the nights cool enough to render sleeping under blankets agreeable.

Lower California furnishes a climate equal to any on the face of the earth; the temperature is almost without variation, the average range for the winter months being 55° to 60°, in the summer never rising so high as to be uncomfortable.

Suitable climates are also found in Southern Europe, Egypt, Malta, Malaga, Riviera, and the islands and shores of the Mediterranean.

The diet of a patient suffering from Bright's disease should be light but nutritious, keeping in mind the fact that nitrogenous foods increase the formation of urea, while non-nitrogenous foods diminish it. Spirituous liquors should be scrupulously avoided.

Mention may be made of such articles as the following: milk, eggs, sparingly of meats once a day, fresh fish, light broths, peas, beans, stale bread, fruits, and cocoa in preference to tea or coffee.

The diarrhœa and dysentery occasionally present during this disease is really a vicarious action on the part of the intestinal membrane, whereby it relieves the kidneys of considerable labor by passing off urea and other products; it is therefore a beneficial action and should be dealt with very carefully. A too sudden cessation may suddenly cut off the patient by convulsions or effusions into some of the serous cavities. Dropsical effusions are safety-valves relieving the kidneys from over-work, and no endeavor should be made to rapidly absorb them until they are themselves on the decline, or, at least, at a stand-still.

The constant tendency to bronchial affections in this disease requires special attention; these affections are often serious, and sometimes the immediate cause of death. Dashing the chest with cold water, followed by brisk rubbing of the skin with a coarse towel until it glows, every morning, will do much toward fortifying against chest-colds.

The use of mineral waters should be seriously considered. The writer is of the opinion that much of the benefit derived from various spring-waters lies in the fact that the patient is at the springs, and daily takes much open-air exercise, and is entertained and diverted. Further than this, much of the good comes from the large use of nearly pure water which floods the kidneys and clears the tubes and tubules of their obstructions. The use of these waters should be encouraged. The Bethesda water, of Waukeshaw, and the Bailey Springs water are of the right class.

When there is associated with the kidney lesion a catarrh of the renal pelvis and bladder, manifested by large mucous deposits in the urine, the writer has observed the most marked benefit follow the use of Clysmic water.

For remedies see end of the chapter.

Lardaceous Kidney.

Definition.—A chronic form of Bright's disease in which the kidneys together with the tissues generally undergo a so-called waxy degeneration, a process originating in the vascular system and associated with scrofulosis, syphilis, and suppurative processes generally.

Ætiology.—This disease is not in any sense confined to the kidneys; the process in these organs may precede or be coeval with suppurative processes throughout the system. Hence it has for its basis a strumous, phthisical, or syphilitic taint, conditions inseparably connected with the blood; therefore, wherever this tissue is found, the waxy deposition takes place.

Pathology.—The essential pathological condition appears to be an infiltration or infusion into the tissues, from the blood, of an abnormal product, the exact nature of which has long been a matter of dispute. Earlier pathologists believe it to be a substance allied to starch, because of its characteristic reaction under iodine; hence the name of amyloid degeneration was given. Later, this hypothesis was found to be wholly erroneous, as the waxy product proved to be nitrogenous.

A close analysis has shown it to be more nearly related to fibrin than to any other substance at present known. This was first surmised by the fact that fibrin, being held in solution in the blood by the presence of alkaline salts, is deposited and solidified by the loss of these elements. Experiments made by Dickinson and others are based upon this point; these experimenters found that when fibrin is de-alkalized it gives the characteristic brown stain with iodine; on the other hand, the lardaceous matter, being dissolved with caustic potash, fails to respond to the iodine, thereby showing a similarity of action between the lardaceous matter and the de-alkalized fibrin. A further evidence in favor of this hypothesis is found in a rare case (C. Roberts'), in which were found casts resembling exactly the ordinary fibrinous cast, but whose reaction with iodine showed them to have undergone some peculiar change, presumably the process of de-alkalization.

The infiltrating process goes on in all vascular structures of the body, and especially in the glands, as the liver, spleen, etc.

In the kidney the process of degeneration is marked by three stages: first, *the stage of commencing infiltration;* here the first change recognizable is a somewhat paler appearance of the organ; it is of normal size, and the capsule is free from attachments. A section shows that the relative size of the part is normal and the appearance natural; in some cases glistening dots may be observed. The application of iodine solution at this time will bring the Malpighian tufts into prominence as small dark spots; later, the peculiar iodine stain will appear.

Microscopic examination shows that the tubes and stroma are unaffected, but that alterations are taking place in the walls of the vessels and first in those of the Malpighian tufts. Effusion has taken place in the middle coat, causing a thickening of the vessel and consequent prominence of the tufts.

The disease passes from this condition to the *second stage*, in which the changes are more marked. The organ is enlarged, the surface pale and smooth, the capsule more or less adherent. Large blotches of extravasation may appear on the pale surface or the stellate venous discolorations. Section shows that the enlargement is mainly due to increase in the cortical substance; the exposed surface is pale, and has a transparent or glassy look, especially if fatty degeneration is marked; if not, a pinkish hue is added to the transparency. The application of iodine shows greater areas of discoloration. In this stage, owing to the porous condition of the thickened arterial walls, there is an infiltration of blood-plasma from the Malpighian vessels into the tubes. This free transudation causes an increased flow of urine, a result favored by the increased firmness of the tubes. This firmness is the result of the adhesion and agglomeration of exuded epithelial cells which thus form, as it were, a supporting wall.

According to Dickinson, the casts are then formed from the fibrin of the plasmic exudate. Exception must be taken to this statement in view of the fact that hyaline and waxy casts which are mainly found in this form contain no fibrin in their composition. Their mode of origin is still a matter of question; the most probable explanation is that they consist largely of mucin, together with cell-contents which have undergone transformation into a structureless mass. They are not lardaceous, and do not react under the iodine solution.

The interstitial tissue appears to be in a chronic state of congestion, kept up by the irritating presence of the morbid product.

The urine is at first copious, later becomes more scant, owing partly to the occlusion of the tubes by casts and also to the pressure exerted by the increased interstitial tissue. Albumin appears soon after the polyuria is noticed, increases with the progress of the disease, and persists to the last. Blood is rarely found at any time. Casts appear early, and in the later stages are very numerous. It is to be noted as a peculiar fact that while this disease originates in the vascular system, very few cardiac lesions are found; hypertrophy is rarely met with. The brain and nervous system seem to share the same immunity.

The second stage may continue a number of years, and the disease, if not checked in this period, generally proves fatal; however, it may lapse into a condition associated with contracted kidneys and constituting the *third stage* or stage of atrophy. In this, the kidney appears shrunken; the capsule is removed with difficulty; the surface is rough and granular. The kidney-substance has a distinctly granular feel and anæmic appearance; the cortex is wasted, but the stroma is noticeably increased. Extensive destruction has taken place among the tubules; the small arteries are atheromatous; the Malpighian tufts are consequently prominent, and, owing to atrophy of intervening tissue, bunched together. A large number of the tubules are completely obliterated, others are more or less contracted. This is a very late condition, and one seldom reached.

Symptomatology.—As in cirrhosis, it requires a long time for this disease to develop, and during this process only a few characteristic symptoms manifest themselves as proceeding from the kidneys. That these organs are affected is in many cases a matter of inference from the characteristic degeneration of other organs, as of the liver and spleen. But by the time these changes become manifest, a late stage of the disease has been reached; it may terminate fatally in a few months. Before reaching this advanced condition, the patient has probably suffered for months or years from some wasting disease, or suppurative process, as phthisis, syphilis, or chronic bone-disease.

The urine, which at first contains no albumin, gradually becomes albuminous, increased in quantity, pale, clear, and of low specific gravity. Hyaline casts appear early, but are very difficult to discover.

With the advance of the disease, the patient becomes more weak and cachetic. The deposition of lardaceous matter in all the tissues has the effect of maintaining a constant state of subacute inflammation. Especially are the coats of the intestines involved; as a result of this, persistent diarrhœa sets in.

The mucous lining of the respiratory tract is deeply affected, with the result of maintaining inflammatory affections of the throat and lungs, as bronchitis and pneumonia. The liver and spleen are noticeably enlarged and extensively infiltrated. The blood shows an increase of leucocytes, and a granular degeneration of the red corpuscles.

In lardaceous disease three conditions are worthy of special note: first, the limited degree of dropsy; second, the almost complete elimination of urea; and third, the infrequency of cerebral symptoms as compared with the two preceding forms of Bright's. The non-retention of urea and the absence of cerebral symptoms bear to each other a reciprocal relation. The wasting discharges from the body carry off urea and prevent its accumulation in quantity.

The patient finally succumbs to the excessive drain on the system or to some complication, as bronchitis, pneumonia, or uræmic poisoning.

Diagnosis.—The early stages of this disease are in most cases too obscure to permit of recognition, but when the characteristic symptoms have made their appearance an error in diagnosis is hardly possible. In addition to the kidney symptoms, which may be obscure, we have the characteristic systemic disturbances.

Prognosis.—Of all the forms of Bright's disease, the lardaceous is the most amenable to treatment, with the exception of the acute tubal form.

The course is irregular, varying repeatedly from better to worse; and as it depends most frequently upon protracted suppuration, a cure may often be effected by the removal of this sustaining cause by proper medicinal and hygienic treatment. The general tendency, however, of the disease is toward a fatal termination, after running a course of several years.

Treatment.—*General Management.*—The general management, as regards clothing, the skin, etc., is much the same as in the granular kidney. But as the causes and course are different, the treatment will also vary. The diet should be much more generous, and every effort be made to restore the blood to its normal state. Beef and beef-juice—especially Valentine's—are to be recommended.

Attention should, of course, be directed to the removal of the cause, whether suppurative, phthisical, or syphilitic. The lardaceous kidney may be restored to health.

Complications of Bright's Diseases.—Cardiac hypertrophy is an important complication of the parenchymatous form, especially in the atrophic stage. But it is most commonly met with in the cirrhotic kidney, and when associated with an insidious renal disease may suggest this form. Œdema of the lungs or inflammation of the bronchi and lungs are of frequent occurrence, and may be present at any stage. Pericarditis, pleurisy, and peritonitis may also occur. Prof. Loomis places endocarditis as the most frequent of the inflammations of the serous membranes, and ascribes this to the fact that the endocardial surface is so constantly exposed to the irritating influence of the poison in the blood. Sanguineous and serous apoplexies may also occur.

Inflammations of the various organs and tissues form the more common complications of the amyloid kidney, causing prolonged diarrhœa and throat and lung troubles; the liver, spleen, and lymphatic glands are enlarged and infiltrated.

In the cirrhotic form, in addition to the hypertrophy of the left ventricle and valvular disease, we find also chronic bronchitis, an amaurotic condition of one or both eyes and, in the advanced stages, hæmorrhages in different organs, of which the cerebral is by far the most serious. The occurrence of cerebral hæmorrhage is due to the fact that in cirrhotic kidney we are likely to have degeneration of the cerebral arteries which break down under the increased force imparted to the blood-current by the hypertrophied left ventricle.

The tunics of the eye present certain changes which should be noted. The most characteristic of these are seen in the fundus and generally appear in the chronic form of the disease. Retinal changes have been found before degenerative changes were detected in the kidneys. The retina, in the neighborhood of the disk, has a pale appearance, and small irregular patches of various sizes are scattered about the fundus, especially about the macula lutea. Swelling and opacity of the retina or hæmorrhages may occur; or we may find atrophic changes of the retina and choroid, as also hæmorrhage into the latter.

The sight, as has been stated, is also more or less impaired. Uræmic amblyopia occurs in the acute form of the disease, especially in connection with the albuminuria of pregnancy, while neuro-retinitis is frequent in the cirrhotic form.

Gangrenous erysipelas and phlegmonous swellings are observed frequently in the parenchymatous form of Bright's disease.

Differential Diagnosis.—In the differential diagnosis we follow in the main the admirable work of Grainger Stewart. We differentiate first from the history of a previous illness; the inflammatory form follows an acute disease, scarlatina, pneumonia, and like diseases; the waxy generally follows syphilis, caries, or some wasting disease; the cirrhotic is the result of gout or lead-poisoning. Second, from the present illness. If dropsy and diminution of urine and fever appear suddenly, or if the dropsy and diminution of urine appear gradually, the inflammatory form may be suspected. When coming on insidiously, with increased flow, a waxy condition may be looked for. When coming on insidiously and without marked symptoms until dimness of vision or uræmic convulsions appear, the cirrhotic kidney will be indicated.

The urine is invariably diminished in the first stage of the inflammatory form; it is often diminished, but sometimes it is normal in quantity, in the second stage; in the third stage it is generally diminished. In the waxy form, the urine is increased from the beginning. If the inflammatory form should be superadded, or severe diarrhœa be present, the urine may be diminished in quantity. In the cirrhotic form the urine is nearly normal in the earlier stages, but in the advanced stages it may become excessive. The color of the urine is dark in the earlier stages of the inflammatory form, and somewhat lighter in the later stages. In the waxy or cirrhotic forms it is usually pale. The specific gravity is generally lower in the chronic forms than in the acute.

Albumin is copious throughout the inflammatory form, and sometimes excessive. In the other forms it is less copious, and sometimes is wanting entirely.

Tube-casts are sometimes an important element in diagnosis or prognosis.

Blood-casts indicate intense congestion and hæmorrhage into the tubes, as in acute tubal nephritis.

Granular casts are not pathognomonic of any form; but large, coarse granular casts are found most frequently in cirrhotic kidney.

Epithelial casts are most commonly found in the tubal form, and may appear early in the others. The gravity of their presence depends upon the nature of the cells.

Hyaline casts are associated with all stages and forms, but they are characteristic of the chronic forms, as the cirrhotic and waxy. Their appearance in these indicates serious mischief in the tubes.

Fatty casts are also found in connection with all stages; their importance depends upon associated conditions. When occurring in the latter part of an acute attack they are a favorable sign, the inflammatory products being thus thrown off. In advanced stages of the chronic forms, oil-globules appear on the surface of hyaline casts; or casts appear to be made up entirely of these globules. This indicates a late stage in the destructive process.

Dropsy shows inflammation of the tubules, and as such is of importance; the dropsy disappears with the inflammation. It is absent or present to a slight degree in the waxy and contracting cases; but it appears whenever an inflammatory attack is superadded.

TREATMENT OF BRIGHT'S DISEASE.

While we obtain some excellent suggestions from the old school as to general and palliative measures in the treatment of this disease, their specific or medicinal treatment is admittedly of little value. In support of this statement, and to show how frequently the fashions change in old-school therapeutics, we refer the reader to the valuable clinical treatise of Professor Loomis, from which we quote as follows, p. 507 *et seq.*: "Formerly, when the disease was regarded as an albuminous nephritis, general and local blood-letting was practiced; this was soon found to be attended with bad results." . . . . "At one time, mercurials were extensively employed in the treatment of these diseases, with the idea of putting the system under its constitutional effects and keeping it so for months. This plan has also been abandoned." . . . . "As soon as the pathology of the disease became better understood, an entirely different plan of treatment was adopted, based upon entirely different principles, ... that is, the skin was to perform the work of the kidneys. Upon this principle was based what is known as the diaphoretic plan of treatment. Very soon a strong addition was made to the diaphoretic plan, by calling in the assistance of hydragogue cathartics." . . . . "It is true that under the conjoined action of these two plans, this class of patients will for a time appear very much relieved; but after a few active purgations, and a few hot-air baths, they will begin to complain of extreme weakness, and very soon reach a point at which the combined action of these agents fails even to relieve the distressing symptoms, and their condition is worse than before their administration was commenced.". . . . "I will now briefly consider the treatment of amyloid degeneration of the kidney. So far as I am aware, this is an incurable disease; we have no means for arresting or preventing its development." . . . . "The cirrhotic form of Bright's disease is the most hopeless of all the forms of this disease. When cirrhosis of the kidney is once developed, its tendency is to progress." . . . . "In this form of the disease little is to be gained by the adoption of any special plan of treatment." The one only remedy in which any faith is placed is *Digitalis*, and even this should be accompanied with the very necessary caution to beware of its enfeebling action upon the heart.

In view of these facts we can point with some pride to the long list of remedies at our command; remedies which have over and over again proved their efficiency in the treatment of this disease. The list should be supplemented by reference to the chapter on the treatment of nephritis.

Apis mel.—In the albuminuria which follows scarlatina and diphtheria. Bloating of the face and limbs; labored breathing; pain in the lumbar region, aggravated by pressure; urine scanty, with frequent urgings. Œdematous condition of the entire body. Apis has proven curative in cases where the urine was heavily charged with albumin, and contained blood-corpuscles. While many practitioners value Apis highly in the conditions given above, others report that this drug has always failed to relieve, although well indicated symptomatically. The difficulty may lie in not obtaining a good preparation of the drug. The writer has used the triturations with best results.

Aurum muriaticum.—In albuminuria in which there is marked vesical irritation with painful retention of urine and pressure on the bladder. Urine milky in appearance, with mucous sediment and ammoniacal odor, or urine high-colored and with a sand-like deposit; urine decomposes rapidly. Bright's disease associated with a mercurial or syphilitic cachexia, caries and indurations. Dr. Millard has proven its value in chronic interstitial nephritis, especially when associated with nervous symptoms, hypochondriasis, irritability and vertigo

Arsenicum.—This drug in poisonous doses has produced scanty, bloody, and albuminous urine. It has also induced fatty degeneration of the tissues, and the tubules of the kidneys have been found filled with fat-globules and the epithelia partly destroyed. The dropsical symptoms of Arsenical poisoning may be found associated with albuminuria and tube-casts. The well-known pathogenetic symptoms, pallor, nausea, thirst, neuralgic pains, anasarca, and exhaustion produced by this drug are frequently common to these forms of kidney disease. Nevertheless, the curative results of Arsenic in Bright's diseases have not been as marked as we might expect.

Baehr expresses a doubt about the usefulness of Arsenic, while Millard says that he has found benefit from its use in only a few cases. The latter author relates one case of chronic croupous nephritis, in a young man, the result of cold, and accompanied by nausea and anasarca; Fowler's solution, gtt. v. three times a day, was given. Arsenic has been used in nephritis after scarlatina with ascites; hydrothorax; œdema pulmonum; scanty, dense, bloody, and albuminous urine. When inflammatory disease of the heart is present, this remedy is of value. The general constitutional symptoms of Arsenic have a similarity, according to Baehr, to the third stage of parenchymatous nephritis. Raue groups the symptoms calling for this drug as follows: Great anxiety at night, driving out of bed; vomiting of brownish masses, with violent pain in the bowels; pressure and burning pains in the stomach; swelling of the genitals; palpitation of the heart, left side of heart predominantly affected. It has been used successfully for albuminuria, headache and nausea, especially when debility and anæmia are accompaniments. In nephritis following extensive burns. *Calc. arsen.* is indicated in the anæmia, progressive emaciation, and debility of this disease.

Benzoic acid.—May be serviceable when there is the peculiar offensive odor of the urine characteristic of this drug, especially in the gouty diathesis and when associated with vesical catarrh.

Cantharides.—Urine contains cylindrical casts of fibrinous exudation, epithelial cells, and blood, and is therefore easily coagulable. Uræmic cerebral symptoms, with stupor. After burns, and when the inflammatory conditions are marked.

Coccus cacti.—This remedy is said to act upon the kidneys, and it has relieved cases in which anasarca and ascites, with scanty, turbid, albuminous urine, were present. It has also relieved the suffocative distress of breathing and cough of Bright's disease due to ascites and hydrothorax. Grauvogl used it successfully in acute Bright's disease.

Convallaria majalis.*—It has been used within the last few years, and often with great relief, for cases of nephritis and chronic Bright's diseases, especially when the heart is involved. It has proved of value in chronic croupous nephritis with scanty urine. The heart is affected both in its muscles and valves. Under its use the urine is increased in quantity, although the amount of albumin may not be diminished. In deficient circulation from organic heart-disease, associated with dropsy and diminished urine, Convallaria has acted better in some cases than Digitalis. It has afforded relief when there was extremely rapid and irregular action of the heart, also in general anasarca and ascites from mitral insufficiency with cardiac dilatation and hypertrophy.

According to Prof. Sée, Convallaria is of value in palpitations, mitral constrictions, in insufficient compensation of the right ventricle and left auricle, dyspnœa, mitral insufficiency, dilatation of the left ventricle, and in cardopathies with dropsy. It produces augmentation of the energy of the heart, and its diuretic effects are likely due to this power.

Crotalus.—In the valuable contribution of Dr. J. W. Hayward, of Liverpool, to the *Physiological and Applied Materia Medica*, vol. i., just published, will be found by far the most complete disquisition on the rattlesnake-poison now extant. The plain teaching of the experiments therein set forth is the relation of this drug to acute and destructive forms of Bright's disease. The albuminuria, cerebral disturbances, and blood-disorganizing effects plainly point in this direction.

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* Millard on Bright's Diseases.

Digitalis.—This remedy is in frequent use for Bright's disease, although albuminuria is not one of its pathogenetic symptoms. It is of service when cardiac complications are present. It is largely employed by the old school as a diuretic. It is also of service when the circulation is weak on account of defective action of the heart, and when rheumatic pains and pulmonary catarrh with profuse serous expectoration are well-marked symptoms. Digitalin is a favorite preparation with many practitioners.

Glonoine.—Albuminous urine, high-colored urine, burning while passing, with red sediment and reddish-yellow slime, are among the pathogenetic effects of this drug. Dr. Robson * has used it in doses of one to three drops of the tincture in several cases of acute and chronic croupous nephritis, and also in the hæmorrhagic form. Œdema, anasarca, hypertrophy of the heart, vascular tension, albuminous urine containing renal epithelia, casts, and blood, were more or less prominent conditions in his cases.

Helonias.—This remedy proved curative in a case in which scanty menstruation, heaviness, languor, drowsiness, and albuminous urine were prominent symptoms.

Mercurius corrosivus.—This is one of the great remedies in acute tubal nephritis, having proven curative in the hands of the writer in many cases. Cases of poisoning by this drug show the kidneys to be injected and inflamed, especially the glomeruli. Many of the lesions of the kidneys which are found in cases of chronic poisoning are analogous to those of parenchymatous nephritis, such as increase in size, destruction of the epithelium, and plastic exudation. Baehr, referring to the adaptability of Mercurius to uræmic conditions and its power to cause a condition simulating typhus with convulsions, draws the following comparison with Belladonna: The convulsions of the latter break out speedily when the poison first begins to act; the Mercurius convulsions, on the contrary, not till the poison has acted for some time, which shows that Mercurius is more appropriate when, after the inflammation has lasted for some time, symptoms of suppuration, and subsequently those of uræmia, gradually become manifest. Poisoning by Mercurius corrosivus has the following post-mortem appearances: kidneys enlarged, dark-red on the cut surfaces, the cortex and pyramids scarcely distinguishable. Left kidney of looser texture than normal, contained a small abscess; the bladder was completely empty and contracted. In this instance the urine had been almost entirely suppressed. Lumbar pains in the renal region. Urine scanty, with frequent desire, or entirely suppressed. Urine blackish, bloody, albuminous, and containing fatty epithelial and granular detritus. Diarrhœa, with colic and tenesmus; offensive discharges. Puffiness of face and feet; great dyspnœa.

Nitric acid.—In the albuminuria of syphilitic patients or the albuminuria following the abuse of Mercury or associated with suppuration of bones. Urine muddy in appearance, scanty, and of foul odor. Œdema of the lower extremities. Skin dry and hot.

Phosphorus.—When death has occurred from poisoning by this drug the kidneys have been found softened and of a yellowish-brown color; the cortical substance was hypertrophied, but not very granular; the corpora Malpighii were injected, and the tubuli uriniferi of a whitish color due to the granulo-fatty degeneration of the epithelial cells; the tubes were also filled with exudation-débris. The urine contained epithelial cells, pus, albumen, exudation-casts and, occasionally, blood-cells. In rapidly fatal cases a hyperæmic state of the kidneys was found. A pneumonic inflammation is a frequent accompaniment of Phosphorus-poisoning.

Among the pathogenetic effects we find marked vesical symptoms with frequent desire to urinate, the urine being abundantly secreted under the influence of small doses, but suppressed by large doses. Urine scanty, brownish, and containing albumin and biliary pigment, or profuse and colorless; urine dark-colored with reddish sand or whitish sediment. Albuminuria with granular and fatty degeneration and destruction of epithelium. Skin pale and waxy or of a yellowish tint, with puffiness of eyes and face. Baehr recommends Phosphorus for the whole course of the disease, for post-scarlatinal nephritis, and when depending upon suppurations of bones or associated with pneumonia, malignant pulmonary catarrh, or œdema pulmonum. It is also beneficial for the amaurotic conditions incident to Bright's disease. A profuse watery debilitating diarrhœa, the existence of tuberculosis, ulceration of bones, and diseases of the right heart and the pulmonary artery, a condition of general atrophy and nervous exhaustion are additional indications.

Plumbum.—The fact that Plumbum has produced an albuminous condition of the urine and other evidences of renal degeneration should make it a valuable remedy.

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* Millard, Bright's Diseases, p. 183.

Lilienthal gives the following indications: granular kidney, loss of appetite, frontal headache, worse from mental application. Dyspnœa, worse at night; œdema of the ankles; dry skin, even after exercise; colicky pains, obstinate constipation; retracted abdomen. Amaurosis from atrophy of optic nerve (Phos. from retinal hæmorrhage). Epileptiform conditions, paralysis; cutaneous anæsthesia with albuminuria. Pale skin, rapid emaciation, and debility.

Terebinthina.—In acute renal congestion and tubal nephritis Turpentine is one of the most frequently indicated and reliable remedies. Baehr relates a case of poisoning by this remedy in which, with dulness of the head, vomiting, and diarrhœa, there was frequent urging to urinate with scanty discharge of a burning urine containing bloody coagula. The urine contained albumin, cylindrical casts, inflammation-cells, oxalate of lime, but no epithelium. Other cases, however, have shown epithelial detritus. Turpentine then produces irritation, congestion, and inflammation of the kidneys, together with hæmaturia and albuminuria. We have also violent pains in the kidneys extending along the course of the ureters. The urine, which is at first scanty and bloody, or dark like coffee-grounds, becomes afterwards increased in quantity, slimy, and lighter or white in color. The urine has a violet odor. Small doses increase the urinary secretion, while large doses suppress it. Intestinal and bronchial catarrh, anasarca, and general prostration are often present and may be severe in character. The prostration is not accompanied by the restless anguish of Arsenicum, and may be followed by convulsions and coma. The general temperature of the body is lowered, the pulse is diminished in frequency and lessened in power.

Turpentine is serviceable in post-scarlatinal nephritis and in cases characterized by a feeble renal circulation. Baehr recommends its use in the first (parenchymatous), perhaps in the second (amyloid) stage, but not in the third (cirrhotic) stage. "The first effect of Terebinthina is to render the urine clearer and more abundant and to diminish the dropsy; to free the Malpighian capillaries of their congestive torpor, so that the watery portion of the urine is secreted freely and the renal tubes, in consequence, are freed of the dèbris which obstructs them, and rendered capable of performing their functions." [*]

In the *Homœopathic Review*, London, November, 1884, we find an advance "sample" of a proposed Repertory by Dr. J. Gibbs Blake. The subject chosen was, fortunately, diseases of the kidneys, and we are thus enabled to make a most valuable addition to this therapeutic chapter on Bright's diseases. We quote from the several sections their therapeutic portions.

TUBULAR NEPHRITIS.—When suspected after scarlet fever, pain in loins, scanty urine without blood, begin with *Aconite*.

When blood appears, give Terebinth. gtt. ij., 2d dilution, and continue for some days. If dropsy of cellular tissue and serous sacs, *Arsenic* in high potency as well as in drop-doses of *liq. pot. ars.* has been found useful.

If frequent micturition of scalding urine, with irritation of bronchial, laryngeal, or intestinal mucous membrane, *Cantharides* 3^x.

Inflammations of serous membranes, *Arsenicum, Bryonia*.

Œdema of lung causing irritable dry cough, *Ipecacuanha* 1^x.

For coma, *Opium* 1^x is the most indicated, but *Cantharides* 3^x. *Cuprum aceticum* 2^x should be tried, the latter if accompanied by cramps and rigidity of muscles.

If the disease becomes chronic, the scanty urine may be increased by *Digitalis* and is indicated by increased tension of the arteries.

In the chronic form of tubular nephritis, anæmia with exhaustion and lassitude, *Ferrum sulph.* 1^x. The dose must not be large, to avoid aggravation of kidney symptoms (see appendix). [The item referred to is to the effect that Citrate of iron in large doses will produce albuminous urine.]

When the dropsical effusion is accompanied by diarrhœa, *Helleborus* 3^x.

For the coma and convulsions in nephritis of pregnancy, *Apocynum cann.* ϕ, or the subcutaneous injection of the strong extract.

Aconite.—After scarlet fever or diphtheria, fever returns during convalescence, the commencement of nephritis may not be made out.

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[*] Jousset, Traité élément. de Mat. Med., etc, 1884.

Apis.—Dr. Eidherr reports a successful case of nephritis after scarlet fever (*B. J. H.*, vol. 27, p. 50, translated from *Allg. Hom. Zeit.*); also in the same report two cases of Bright's disease (chronic tubular nephritis) in which *Apis* was useful.

Apocynum cann.—A useful intercurrent palliative when the urine is scanty (Atkin, *B. J. H.*, vol. xvii., 282). Dropsy removed in case of albuminuria (Dr. G. Moore, *B. J. H.*, xxiii., 629) which came on during pregnancy. Dr. Fahnestock reports two successful cases of coma and convulsions during pregnancy, by subcutaneous injection of a strong extract of *Apocynum cann.* (*B. J. H.*, xxxviii., 280; *U. S. Med. Invest.*, Nov., 1878).

Arsenicum.—Dr. Pope found *Ars.* 3^x efficient in acute nephritis (*B. J. H.*, vol. xii., p. 485).

Five drops of Fowler's solution benefited a case of acute nephritis (Dr. F. Farr, *Lancet*, 1862, vol. i., p. 68—quoted in *B. J. H.*, vol. xx., p. 344). In the acute nephritis following scarlet fever with ascites and for the coryza of granular kidney (Kidd, *B. J. H.*, xiii., 566). A striking case of chronic nephritis cured by *Liq. arsen.* reported by Professor Henderson (*B. J. H.*, vol. xvi., p. 20).

Cantharides.—Used with advantage by Dr. Atkins in two cases of nephritis after diphtheria, urine scanty, blood-disks, epithelial scales, and albumin (*B. J. H.*, vol. xvii., p. 287). Early stages of degenerative disease, and in acute and chronic tubular nephritis. Scanty, high-colored urine, scalding irritation of bladder and urethra, aching in loins or testes. Epithelial scales in urine, anæmia, coma. Especially useful in cases associated with stricture or prostatic disease (Kidd, *B. J. H.*, vol. xiv., 566).

Chelidonium.—A case, probably of granular kidney, reported by Dr. Buchanan in which Chelidonium 6^x acted well.

China.—Of great service in relieving exhaustion and lassitude, complained of in every stage of the disease (Kidd, *B. J. H.*, xiii., p. 567).

Colocynthis.—A case of albuminuria combined with sciatica, cured by *Colocynthis* θ. Dr. Peters (*North Amer. Journ. Hom.*, vol. iv., p. 226).

Crotalus.—Albuminuria of exanthemata (Dr. Hayward, *Mat. Med., Physiolog. and Applied*, vol. i., p. 310).

Cuprum act. 1st dil.—Cramps and rigidity of the muscles, with neuralgic pains during sleep (Kidd, *B. J. H.*, xiii., p. 574).

Nux vomica.—Useful for heaviness and stupor.

Opium.—A palliative for stupor.

Terebinthina.—Most useful when blood is present in the urine (Atkin, *B. J. H.*, vol. xviii., p. 282). Indicated by scanty urine, deep-colored, containing blood, abundant albumin, extensive anasarca, irritability or relaxation of the bowels, anorexia, abundant mucous expectoration (Kidd, *B. J. H.*, vol. xiii., p. 566.) Professor Henderson reports a successful case of hæmaturia of three months' duration, probably due to chronic nephritis, a sequel of typhoid fever (*B. J. H.*, vol. xix., p. 15); also a case of the same disease after scarlet fever.

Chronic Tubular Nephritis.—Apis, Arsen. alb., Arsenite of copper, Crotalus, Ferrum, Mercurius cor., Mercurius cyan., Phosphorus, Terebinthina.

Complications.—Aconite, Bryonia, Digitalis, Ferrum, Ipecacuanha, Opium, Scilla, Apocynum cannabinum, Kali nitrate, Arsenuretted hydrogen, Chromic acid, Cubebs, Copaiba, Manganese, Normal Chromate of potash, Normal Chromate of soda, Sabina, Vespa.

Granular Kidneys.—In the early stages of degenerative disease, associated with stricture or renal calculi, *Cantharides* 2^x; when caused by the abuse of alcohol, *Mercurius cor.* 3^x; when caused by lead-poisoning, *Mercurius vivus* 3^x; if not owing to lead-poisoning, *Plumbum acet.*

In this form, too, for hæmaturia, *Terebinthina* should be given.

For the vomiting, *Kreasote* 3^x; nausea and mucous expectoration, Pulsatilla 1^x.

For the nausea and slimy secretion about the mouth, bitter taste, anorexia and constipation, *Acid. nit.* 1^x, *Chelidonium* under similar circumstances.

For the dropsy, *Ferrum mur.* 1^x, *Digitalis* ϕ, *Scilla* 1^x; pericarditis, *Arsen.* 3^x; bronchitis, *Arsen.* 3^x, *Kali bi.* 3^x; laryngeal œdema, *Apis.*

In cases of granular kidney with nausea, slimy secretions from mouth and throat, yellow tongue, bitter acid taste, bilious diarrhœa, or constipation, with piles and anorexia, *Acid. nit.*

Ferrum sulph. 1st dil.—Exhaustion and lassitude.

Helleborus.—When dropsical effusion is accompanied by diarrhœa (Atkin, *B. J. H.*, vol. xvii., p. 282).

Ipecacuanha.—For the irritable dry cough caused by œdema of lungs and for nausea and abundant mucous expectoration (Kidd, *B. J. H*, vol. xiii., p. 567).

Kali bichrom.—Bronchial complications.

Mercurius corr.—Useful in the early stages of granular kidney caused by abuse of alcohol. Successful cases reported by Dr. Peters in *North Amer. Jour. Hom.*, vol. iv , p. 216 *et seq.*

Mercurius vivus. 1st. cent. trit.—Benefit in case of albuminuria, probably granular kidney from lead-poisoning (Dr. J. Moore, *B. J. H*, vol. xxiii., p. 632).

For renal asthma, *Amyl nitr.* 2^x.

For the vomiting, ice, soda-water, and milk.

For the epistaxis, plugging with perchloride of iron and cotton-wool, ice. When the accumulation of water is great, *Elaterium* is necessary to relieve the stasis, to enable a specific medicine to act.

Cantharides, Digitalis, Mercuris cor., Plumbum, Acid nitr., Chromic acid, Cobalt, Manganese, Nickel, Normal Chromate of potash, Normal Chromate of soda

LARDACEOUS DISEASE.—*Amm. muriat.*, *Acid nitr.* 1^x, and *Acid phos.* 1^x help to arrest progress.

If owing to syphilitic poison, *Kali hydriod.*

Syphilitic origin, Merc. cor. 3^x, continued some weeks. If evidence of fatty degeneration, *Phosphorus* is indicated.

Mercury.—A supposed cause of lardaceous disease (Graves and G. Budd).

M. Bouilland (*Comptes Rendus*, vol. xc., p. 188, Sur les Lésions du Rein et de la Vessie dans l'Empoisonnement rapide par la *Cantharidine*, note de M. V. Cornil) has shown that *Cantharides* causes a true albuminous pyelo-nephritis, which was confirmed by the researches of Morel-Lavallie and Gubler.

Thadeus-Brovicz (*Centralblatt*, 1st March, 1879) found an effusion of paraglobuline in the capsules of the glomeruli, and interstitial nephritis.

Poisoning[*] with the normal *salts of chromium* brings on a severe parenchymatous kidney-mischief. In animals which survived the poisoning at least twelve hours, the epithelium of the injured urinary tubules was more or less swollen, metamorphosed into a dead mass without nuclei, either granular or homogeneous. The glomeruli and the straight tubules had normal epithelium. When smaller doses of *chrome salts* were used, no cell-necrosis was produced and the casts which were found in the urine were simply fibrine casts.[†]

1. Manganese[‡] is not poisonous in the stomach, but in the blood it is one of the strongest metallic poisons.

2. Manganese, as well as most other hard metals, produces a peculiar

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[*] Die Fortschritte der Nierenpathologie von Lépine. German translation by Havelburg.

[†] A fuller account of the pathogenesis of *chrome salts*, given by Gergers, Archiv für Experimentelle Pathologie, bd. vi., 148. Weigert, Virchow's Archiv., bd. lxxii., 254.

[‡] Zur Pharmacologie des Mangans und Eisens. Von Dr. Rudolf Kobert. Archiv. für Experimentelle Pathologie, xvi., p. 390, 1883.

nephritis which is of the greatest importance for the study of the connection between parenchymatous and interstitial nephritis.

URÆMIA.

In uræmia the brunt of the attack is borne by the nervous system; the exact nature of the malady is as yet obscure.

Ætiology and **Pathology.**—It occurs in connection with Bright's diseases and other maladies associated with defective action of the kidneys, and not as an independent condition. It is a frequent complication in pregnancy and parturition, and in general occurs with a suppression of urine from any cause.

The many theories advanced by way of explanation are classified under two heads; *the mechanical* and *the chemical.* The early investigators held to the chemical hypothesis and ascribed the symptoms to the retention and presence of urea in the blood; according to Frerich, the retained urea owes its virulence to the presence of a ferment. This and other theories on the chemical basis obtained a passing recognition from time to time, but the chemical theory is now rejected altogether by the authorities. The mechanical theory, ascribing the condition to injurious pressure upon the brain and other nerve-centres, offers a better explanation. Thus are mentioned arachnitis, œdema of the brain from impoverished blood-serum, and increased blood-pressure due to a hypertrophied heart; structural changes in the brain; the presence of carbonate of ammonia in the blood, or the accumulation of other metamorphosed tissues. What seems to be a very rational supposition is that it is due to many combined causes; "the functions of the kidneys being interrupted, there is an increase of waste materials in the blood; an accumulation of water in the tissues, with consequent impoverishment of the blood and increased tension of the blood-vessels."

Symptomatology.—The manifestations of uræmia are included under two forms, the *acute* and *chronic.*

The acute form is characterized by an abruptness of onset, and is further subdivided, according to the nature of the symptoms, into the *comatose*, the *convulsive*, and the *mixed.*

In the comatose form, insensibility marks the very onset; or it is preceded by vertigo, with nausea and vomiting, violent headache, dyspnœa, and ophthalmic symptoms, such as dimness of sight, etc. Coma soon sets in, characterized by heavy stertorous breathing, extreme pallor, contracted pupils, and a cold clammy skin. This may continue for several hours and terminate fatally, or the symptoms may abate and recovery ensue. The patient however is liable to subsequent attacks.

The comatose form is most frequently associated with the inflammatory and cirrhotic types of Bright's disease.

The *convulsive form* is characterized by peculiar muscular twitchings, followed by more violent symptoms. The convulsions are generally of an epileptiform character and are usually followed by a comatose condition. They may consist of a single attack or of a succession of paroxysms which follow at uncertain intervals; between the paroxysms there may be insensibility, stertorous breathing, pale face and dilated pupils, or deep drowsiness from which the patient may be partially aroused. The first attack may prove fatal, or the attacks may return at irregular intervals for an indefinite period. Coma may come on insidiously or suddenly, and in the latter case may be mistaken for apoplexy or narcotic poisoning.

The *mixed form* is a term used to include those attacks which partake of the character of each of the preceding forms. The coma may be succeeded by convulsive paroxysms, or be accompanied with delirium and dyspnœa.

In all these forms dimness of vision is present, which is usually transient in character; the loss of sight may, however, be complete for a time, especially when accompanying a convulsion. The ophthalmoscope does not reveal any evidence of organic change in the eye, the cause being a cerebral one. This condition of uræmic amblyopia must be distinguished from retinitis apoplectica, which also occurs in some cases of Bright's disease and in which the loss of sight, even when not complete, is always permanent. Deafness may occur, but it is not a common condition.

The *chronic form* occurs most usually in the later stages of Bright's disease. Its approach is marked by general and extreme languor with dulness and headache. The dulness progresses into apathy and torpor; finally, delirious symptoms supervene, with coma, oppressed and stridulous breathing. As a rule, death closes the scene.

Diagnosis.—The diagnosis is comparatively easy because of the association with renal disturbance; in some cases, however, it is obscure; an examination of the urine will generally clear up the case. It is distinguished from apoplexy by the absence of paralysis of voluntary muscles, by the quickened pulse and respiration, and an increased loudness of the stertorous breathing as well as by the partial recovery of consciousness between the convulsive attacks, should they be present. The face in uræmia is nearly always pale, but not so deathlike as in epilepsy, for which the convulsive form may be mistaken. In epilepsy the peculiar cry is to be remembered, and the tendency of the convulsive seizure to affect single parts. Otherwise, there are many points of similarity between the two affections, and to differentiate, it may be necessary to have recourse to the urinary test.

In opium-poisoning the pupils are contracted and there is no remission in the insensibility. There is usually complete suppression of urine before a uræmic attack, but suppression of the urine may occur in Bright's diseases without the appearance of uræmic symptoms; vomiting and diarrhœa are frequently present, but the vomiting due to uræmic poisoning is without reference to the contents of the stomach and is very frequent and difficult to control.

Prognosis.—Uræmia is at all times a serious condition. In the acute form, unattended by serious kidney lesions, the prognosis may be favorable; so also in cases in which it depends upon a transient cause which may be completely removed. In the chronic form, attended by advanced renal disease, the prognosis is always grave; recovery is impossible.

Treatment.—First remove the cause by reëstablishing the urinary secretion. To this end, apply poultices and fomentations to the renal region; place the patient in hot packs or the vapor bath, to induce free and copious sweating and thus supplement the action of the disabled kidneys; the catheter should be frequently used to draw off accumulations in the bladder. It may be necessary to control violent convulsions by the use of an anæsthetic or anodyne, but it should be borne in mind that in these paroxysms the most strikingly beneficial results are obtained by the exhibition of the homœopathically indicated remedy.

In some cases time may be gained for the exhibition of directly curative measures by the diuretic action of Pilocarpin, or the powerful hydragogue Elaterium. However, when the heart's action is weak, great caution should be used in the employment of such depleting agents.

When occurring in connection with Bright's diseases, the following remedies should be borne in mind: Apis, Apocynum, Arsenicum, Benzoic acid, Cuprum ars., Hydrocyanic acid, Kali nitricum, Nicotinum, Phosphorus, Terebinthina, Uran. nitr.

Acute attack during pregnancy or scarlatina: Apis, Belladonna, Cantharides, Conium, Cuprum, Gelsemium, Glonoine, Lachesis, Stramonium, Veratrum vir.

With coma: Agaricus, Anacardium, Belladonna, Hyoscyamus, Opium.

With anæmia: Arsenicum, Camphora, China, Chininum ars., Phosphoric acid.

With paralytic tendencies: Gelsemium, Phosphorus, Physostigma, Picric acid, Strychnia, Tarentula, Zincum phos.

Particular indications are given for the following remedies as those most applicable to uræmic poisoning:

Apis.—This remedy may be called for in a less malignant form. The suppressed urine, general œdema and well-known symptoms of cerebral œdema are sufficient to call attention to it.

Arsenicum.—The symptoms of blood-disorganization, great prostration and rapid œdema, with the well-known and oft-repeated characteristics of this remedy, indicate its use in uræmia.

Crotalus.—Although the Crotalus has been used by our school to some extent in various forms of blood-poisoning, yet a study of the recent scholarly production of Dr. John W. Hayward in the new *British Materia Medica* will convince anyone of its value in this form of blood-poisoning. It will undoubtedly be of service in the most acute and malignant forms of this disease. The clouded intellect of venous congestion, the evidences of meningitis, such as exist in uræmic conditions, the stupor, the paralytic and convulsive symptoms, the retinitis, the vomiting, the albuminous and bloody urine, and the general symptoms of rapid disorganization of the blood, all point to Crotalus as a remedy of the first importance.

Cuprum.—Indicated by various convulsive symptoms; twitchings, or even violent spasms, followed by a semi-stupor. The eyes are staring and wild, with partial or entire loss of consciousness. Convulsions coming on with a scream. For the above symptoms the *Cuprum aceticum* is to be preferred. Where there are asthmatic symptoms, when symptoms of œdema of the brain appear, and when extreme exhaustion, cold sweats, vomiting, etc., supervene, the *Cuprum arsenicosum* is much to be preferred, although the indications are based mainly upon clinical observation.

NEPHRO-LITHIASIS.

Synonyms.—Renal calculi, Gravel.

Definition.—The term "calculus" refers properly to concretions formed in some part of the kidney, varying in size and differing in composition, but larger than the minute formation known as "gravel." The part of the kidney affected depends upon the locality in which the calculus has lodged, so that we may have inflammation of the substance of the kidney, inflammation of the infundibulum or pelvis, or a combination of the two latter, forming a pyelonephritis; or the renal structure may be entirely destroyed from the long-continued obstruction. Some of these conditions have already been described in the chapter on Nephritis, in which calculi were mentioned as ætiological factors.

Ætiology.—In many cases the causes are obscure. Heredity seems to have an influence in some cases, hence the terms uric, lithic, or oxalic acid diathesis. Calculus occurs most frequently among the young and persons who have passed middle life. It is more frequent also in males than in females. The mode of life has a great influence upon the formation of calculi; food of whatever kind, taken in too large quantities without proper exercise, causes an excessive accumulation of solids which must be thrown off in part by the kidneys. The use of meats as a cause has been greatly over-estimated, as is shown by the frequency of calculus among the poor. Uric acid is generally found in plethoric persons who live mainly upon animal food, yet it may occur in those who are weakly and live sparingly; it is also found in the blood of persons suffering from arthritis and leucæmia. Climate, or rather locality, has a modified influence.

Pathology.—The formation of calculus depends primarily upon a certain morbid state of the system which makes it necessary for the kidneys to eliminate excessive quantities of uric acid, the urates, oxalates, etc.; these, by precipitation in the presence of certain organic bases, form calculous concretions in the kidneys and bladder. The great mass of these bodies are found in the kidney, and may be distributed all through it. However, they are, as a rule, formed in the tubes or infundibula. When found in the ureter or bladder, they have probably passed into them from the kidneys.

The calculi are formed from an excess of one or more of the constituents of the blood, as described above, or the condition of the urine may be such that it cannot hold in solution its normal ingredients. Thus, an acid urine may precipitate the urates, and an alkaline urine may precipitate the carbonates and phosphates of lime. According to Ord and Carter, calculi are not formed by precipitation as described above, but by the change of crystalline constituents to a "submorphous" form by passing through a colloid medium. A calculus increases by successive deposits upon its surface, and so may be composed of a single substance, or of several in conglomeration.

The deposits may be primary, composed of substances directly received from the urine; or the calculus, by its retention in the pelvis of the kidney setting up inflammation and suppuration, may cause a decomposition of the urine, resulting in calcareous deposits of a multiple composition and known as secondary deposits. Calculi are found in new-born babes, and are then called uric acid infarctions. Finally, granular deposits are found in the tubules of the pyramids and cortex. These are generally urates. Triple phosphates and carbonate of lime are also found in the uriniferous tubules, the former appearing first in whitish-yellow stripes, then forming small deposits of the size of hempseeds, or larger, around which the kidney-tissue suppurates and breaks down; the latter appear as nodular masses.

Renal sand and gravel have the same composition as the infarctions, the latter being distinguished only by their larger size.

Symptoms.—The symptoms produced by the presence of calculi may be referable to the kidney proper, to the ureters, or to general disturbances in the system. Thus we have functional disorders of the kidneys, mechanical irritation due to the passage of the calculus through the ureter, the local inflammation set up in the kidney by the retention of the calculus. Gravel may exist for a long time without the patient complaining of any distressing symptoms, or the presence of the urinary deposit may be the only morbid condition discoverable. At other times we may have a train of dyspeptic symptoms associated with the presence of gravel. The larger calculi furnish symptoms which are usually marked in character, although quite large stones have been found in the kidneys, on post-mortem examination, the existence of which was never suspected during life.

The general symptoms are pain or a sense of uneasiness in the lumbar region; a tendency to frequent micturition; changes in the urine, which may contain pus and blood or calcareous fragments; the development of a tumor in the renal region.

One of the most important symptoms is the pain which is associated with the passage of a calculus through the ureter, and which is known as renal colic. We may remark here that severe pain in or about the kidney or along the ureter, not associated with inflammation of this organ, is ordinarily caused by the passage of a calculus, since neuralgia of the kidney is a comparatively rare disease. This pain generally comes on suddenly, but may succeed ill-defined lumbar pains. The former condition generally denotes the entrance of a calculus into the ureter; the latter is more likely to depend upon an irritation of the kidney, or upon a change in the position of the stone. The pains during the passage of a calculus through the ureter are almost always very severe, oftentimes unbearable. This is due to the size or shape of the calculus. The pain extends from the kidney along the affected side, and spreads over the thigh and into the bladder. Numbness of the limb of the affected side may be present, as also swelling and retraction of the testicle, which becomes sensitive to the touch. There are great anxiety, restlessness without obtaining relief in any position, nausea, vomiting, and symptoms of collapse. With this we may have marked strangury and, sometimes, convulsions. After an interval, more or less prolonged, relief is obtained by the passage of the calculus. Hæmaturia may follow the escape of the calculus into the bladder. The urine may be obstructed in its flow by the passage of calculi through both ureters, which, if long continued, may result in death from coma and convulsions.

The conditions due to pyelitis from retained calculus will be found more fully described in the chapter on Nephritis.

Varieties.—The urates, phosphates, and the salts of lime are the varieties most frequently met with. The largest proportion of calculi are made up of uric acid, and as such are frequently found in persons who have passed middle age, and are often associated with the gouty condition. The urates may be associated with the oxalate of lime, forming the mulberry calculus.

Calculi vary in number, and their surfaces may be smooth or rough.

Diagnosis.—The diagnosis, especially in the beginning of the attack, is sometimes very difficult. Enteralgia and peritonitis may be suspected. The starting point and course of the pain, together with the accompanying urinary symptoms, will aid in the diagnosis. Examination of the urine will oftentimes show that calculous disease is present. During the progress of a severe attack the smoky or bloody character of the urine clears up all doubt. A careful examination of the urine should always be made whenever the diagnosis is doubtful.

Renal cancer, the passage of a blood-clot or hydatid vesicle through the ureter, neuralgia of the intercostal or lumbar nerves, and the passage of a gallstone, may simulate the passage of a calculus. Sometimes calculous disease may be present, although the patient may refer most of his symptoms to the bladder. Bloody and purulent urine, with pain over one loin, will lead to the suggestion of the possible presence of renal calculus, since in a bladder affection alone the first symptoms are located entirely in the bladder, and the pain in the loin, if present, follows later.

It is also important to recognize the limitation of the disease to one kidney only, since the question of extirpation may have to be considered as a means of relief. The presence of pain on one side may show an affection of the kidney of that side, but does not prove a healthy state of the opposite kidney. Ebstein, speaking on this point, gives the following hint: "When during the attack of renal colic, in which the ureter of the diseased kidney is so obstructed that none of its secretion can enter the bladder, perfectly normal urine is passed instead of the abnormal secretion which has become customary, there is the greatest probability that one kidney is in a healthy condition." When the ureter is not entirely occluded this diagnostic point will be of no avail. When the calculi are composed of phosphates it is probable that one side only is affected, since this deposit is due to local causes, but when uric acid deposits are present, which owe their origin, as a rule, to constitutional causes, the disease may not be limited to one kidney.

Prognosis.—The presence of calculous deposits in any form is always a serious matter. The course of the disease is generally chronic, and death usually occurs from lesions set up by the mechanical irritation produced by the presence of the calculi.

When seen early in the disease, appropriate treatment and regimen will often remove the causes which produce renal gravel. In cases in which the disease is of local origin the passage of the stone affords permanent relief. Recovery may occur when one kidney has been seriously affected or even destroyed. In such case the products of suppuration may have been discharged into the bladder and thrown out with the urine, the kidney, in the meanwhile, shrivelling and becoming useless.

Treatment.—*General Management.*—As a preventive measure, the diet should be carefully considered more as to quantity than quality. Meat should be sparingly used, as also all other nitrogenized foods, by those who lead a sedentary life. The great point to be attained is to allow no more food than is thoroughly digested and assimilated. When oxalate of lime crystals are present, vegetables which contain oxalates should be avoided, especially rhubarb and sorrel. A milk and vegetable diet should be closely adhered to by those addicted to high living, and who suffer, in consequence, from an excess of uric acid.

Water may be used *ad libitum*. The effervescent aperient and alkaline mineral waters, as those of Vichy, Ems, Carlsbad, and Friedrichshall, are of undoubted value when used in moderation. When discontinued, however, the trouble returns, making it necessary to a cure that the constitutional tendency be corrected. Fresh air and active exercise, together with measures calculated to maintain a healthful condition of the skin, are to be commended. Hot baths will be found useful during the passage of a calculus.

As pain arises from purely mechanical causes, anodynes or anæsthetics may be required to save the patient from needless suffering. A number of remedies are indicated for the acute attack, but the main reliance should be placed upon constitutional treatment. The constitutional remedy will aid in correcting the conditions of malnutrition, and should be carefully studied in connection with every case. This is especially true when the conditions above described are found in the young.

Finally, operative measures may be demanded, and in the following instances: when the calculus has caused suppuration, with discharge by fistulous opening in the lumbar region, an incision is to be made along the track of the sinus and the offending concretion removed; or if the symptoms plainly indicate the presence of a calculus in the kidney, it is not good practice to wait for the formation of a fistula, but an incision should be made down to the kidney and the calculus removed. When the kidney is extensively involved, or when life is rendered unendurable by the continuous flow of urine through the lumbar fistula, then nothing short of extirpation of the kidney should satisfy either patient or practitioner.*

Therapeutics.—Belladonna, Cantharides, Colocynthis, Dioscorea, Ipomea, Lycopodium, Nux vomica, and Opium have frequently aided in the passage of the calculus; but the indications for their use are meagre.

When our object is to remove the effects of malnutrition, and with them the causes producing the calculi, our indicated remedies will render most valuable service.

Dr. S. Lilienthal (*North American Journal of Homœopathy*, May, 1884), in an article on Lithiasis, furnishes the following therapeutic hints:

Arsenicum.—Renal pains with the occasional passage of gravel; pains extend along the ureters. Uric acid sediment; micturition difficult. Alkaline urine with sediment of mucus and urate of lime.

Asparagus.—Nephritic colic with passage of gravel while urinating. Urine of unpleasant odor; bloody urine; reddish deposit in vessel.

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* See Nephrectomy, by J. H. McClelland, M.D. Reprint from Transactions of Hom. Med. Soc. of Penna., 1880.

Belladonna.—Spasmodic, cramp-like pains along the ureters. High-colored urine with brick-dust sediment. Urine gold-colored, depositing a red sediment, with nocturnal pressure on the bladder and shooting, burning pains in the region of the kidneys; when a calculus or gravel is present.

Benzoic acid.—This remedy has among its provings: acid and irritant urine; urine of a disagreeable odor, cloudy, and alkaline. Urine contains urates of ammonia; whitish sediment in the urine, composed of phosphate and carbonate of lime. Urine dark-colored, with mucous sediment. Urine with high specific gravity; granular phosphatic deposits in the urine. Gouty symptoms with vesical catarrh and gastric complications. Benzoate of ammonia is recommended also by Prof. Bartholow when the urine is ammoniacal and loaded with phosphates.

Berberis vulg.—Urine dark-red or yellow in color, becoming turbid, and with a mucous sediment or reddish mealy sediment. Pain, soreness, and burning in the biliary and urinary tracts, especially when severe pain in the hip is present.

Lithium carb.—Used by the old school for gouty and rheumatic troubles. Lithia salts are said to dissolve gravel and render the urine clear. In the new school its use is recommended when there is scanty, dark, acrid urine with dark reddish-brown deposit; urine turbid with mucous deposit; urine profuse with uric acid deposit. Vesical and abdominal pains. Rheumatic stiffness in the limbs.

Lycopodium.—This remedy has lumbar pains radiating into the abdomen and inguinal canal, simulating nephritic colic. Dark-colored ammoniacal urine, with reddish-sandy sediment. Vesical strangury.

Nux vomica.—Will be of service in the concomitant conditions rather than after the formation of gravel. Its use in correcting disordered assimilative functions is too well known to need more than a passing reference.

Ocimum canum.—Turbid urine with a white and albuminous sediment. Cramping pains in the kidneys; renal colic with vomiting; urine red, with brick-dust sediment or discharge of large quantities of bloody urine or thick, purulent urine.

Oxalic acid.—Acid urine, depositing crystals of uric acid and oxalate of lime. Urine causes a burning sensatiōn when passing, depositing a milky-white sediment. Pain in renal region.

Pareira brava.—Difficult micturition with strangury and passage of only a few drops of urine at a time. Violent pains in the bladder and back with retracted left testicle. Pains from thighs, shooting into the feet.

Phosphorus.—Urine scanty and turbid, whitish like curdled milk, with brick-dust sediment and variegated cuticle on the surface.

Sarsaparilla.—Urine passed with difficulty, and containing mucus, pus, gravel, and small calculi. Urine pale when passed, but becoming turbid on standing and depositing a sandy sediment.

Sepia.—Turbid urine with sediment of red sand. Urine reddish with white sediment and pellicle on the surface. Urine offensive with white sediment.

Tabacum.—Constant deadly sickness of the stomach and retching, with cold perspiration; violent colicky pains in the region of the ureter, right or left side.

Uva ursi.—This remedy produces an inflammatory irritation of the mucous membrane of the bladder and urethra, with tenesmus and bloody or purulent urine. It is of service when these conditions are dependent upon the presence of calculi.

Other remedies are Calcarea, Cannabis, Erigeron, Silicea, Zincum.

NEPHRALGIA.

Synonym.—Neuralgia of the kidney.

Neuralgia of the kidneys is plainly symptomatic, and of itself produces little change in the renal secretion or in the renal structure.

In marked cases, however, it becomes so obtrusive and persistent that it takes position as a distinct malady, and accordingly merits attention.

There are also cases in which neuralgia supervenes, or is superadded to other morbid states, as for example, when there are calculi in the renal pelvis; when neuralgia or rheumatism are present elsewhere; in cases of general exhaustion, and from the passage of irritating matters through the kidneys. Attention is also called to "the weak aching" pain complained of by subjects of polyuria, diabetes, and beer-drinkers, undoubtedly caused by the excessive functional activity of the kidneys, and which is essentially a neuralgia. As elsewhere, this neuralgia may be caused by sudden checking of perspiration; the pain may be steady or paroxysmal, and, at times, periodic. It is, moreover, strictly localized, not extending down the ureters or into the genitals. This latter, and the fact that no marked changes are found in the urine, will sufficiently characterize the attack as neuralgic.

General Management.—Subjects of nephralgia should pay particular attention to their foot-wear; warm stockings, woollen by all means, if they can be worn with comfort, and shoes that keep the feet well off the ground. The kidneys should not be overtaxed by excessive beer-drinking, yet sufficient fluid should be taken to keep the salts of the urine in free solution.

To palliate a given attack, apply dry heat in one or several of the many methods, *i. e.*, the hot-water bag, heated salt or corn-meal, hot griddle-cake between flannels, etc.

The remedies oftenest called for are: Berberis, Dulcamara, Belladonna, Pulsatilla, Rhus tox., Arnica, Bryonia, according to their general and special indications.

CYSTS AND TUMORS.

Cystic growths may be simple or congenital. Simple cysts are frequently found in post-mortem examinations in kidneys which are otherwise healthy. They are oftentimes present also in the granular contracted kidney. They are probably caused by obstructions or blocking-up of the renal tubules or distension of the tufts. Simple cysts are usually superficial and confined to the cortical substance, but may extend into the deeper tissues. They vary in size from minute points to that of a small egg, or may reach so large a size that they can be detected through the abdominal walls. The cyst-walls are generally thin, and the contents consist of a clear or yellowish-tinged fluid. Sometimes the contents are of a colloid or jelly-like character. The cysts which appear in the granular kidney are numerous and small. Usually these cysts are not discoverable during life, and cause no inconvenience unless they attain a large size, a somewhat exceptional occurrence. In the latter case they may cause distress by pressure upon surrounding parts. The tumor is generally painless, and has a sensation of fluctuation.

Congenital cysts are interesting only in a pathological point of view. The children are generally born prematurely, and the urinary tract is usually found to participate in the malformation. The kidneys may reach a large size. If the condition is not too far advanced, the child may be born alive, but the malformation generally causes death within a short period.

Cystic degeneration in adults is very rare. When present, it involves, as a rule, both kidneys, with distension and increase in weight. The causes probably depend upon a dilatation of the tubules or Malpighian bodies, or, possibly, may originally result from a slight congenital deformity. It is also said to be related to the granular kidney. When cystic degeneration has reached an advanced stage we may find uræmic symptoms. At other times the disease may be accompanied by pains in the loins and disturbance of the functions of the kidneys. We may be able, at times, to detect a tumor in the renal region, thus obtaining a very positive sign in the establishment of the diagnosis. General symptoms of debility, emaciation, and dyspeptic troubles are often present. Death occurs from uræmic poisoning or from some complicating or accidental acute disease, rendered more dangerous by the renal condition. Fibromata, lipomata, sarcomata, and gliomata are found in the kidneys, but usually give no sign of their presence during life. The sarcomata may develop into tumors which are recognizable by palpation, but their diagnosis from carcinomatous growths is exceedingly difficult.

Treatment.—Internal treatment proves of little avail in these conditions. Surgical interference, in some cases, is advisable and holds out the only hope of obtaining relief. When the diagnosis is clear and the patient in suitable condition, extirpation of the kidney should be practiced without hesitation.

CARCINOMA.

The kidneys may be the seat of a primary or a secondary cancerous degeneration. Primary cancer of the kidney is of unfrequent occurrence, and its causes are not clearly defined. It may appear in very young children, although heredity does not seem to be a factor in such cases. The secondary condition arises from the extension of a cancerous degeneration of other parts.

The pathology of renal cancer, like its ætiology, is still in doubt. Cancer generally attacks but one kidney with nearly equal frequency; it may involve both kidneys when secondary to a general carcinomatous disease. Medullary cancer is the most frequent form, the scirrhous and colloid variety being rare.

Many growths in the kidneys have been described as cancers, but the diagnoses are open to doubt. As a matter of fact, cancer of the kidneys is not a common affection. When the kidney is affected by cancer, especially of the encephaloid form, we find the organ enlarged, with the growth infiltrated through the tissues, or it assumes a nodular form. In the former case the kidney has a more rounded appearance than normal; in the latter the kidney presents an irregular outline. On section of the organ we find a yellowish or whitish appearance of the cut surfaces, especially in the infiltrated condition. If the kidney presents the nodular form, we find that the nodules have this appearance. The surrounding portions of the kidney may present various stages of inflammation or may be in a healthy state. Extravasations of blood, cysts, cavities, or fatty degeneration may be present. The kidney may remain in its normal position and be fastened by extensive adhesions, or it may enlarge and encroach upon other organs, which it displaces, or it may involve them in its own degeneration.

Cancer of the kidney may run an insidious course throughout, giving rise to little or no distress. This is especially true of the secondary forms. When primary, we may have pain in the renal region, bloody urine, and, in time, the presence of a tumor. Pain may be an early symptom, or it may not appear until the diseased condition is far advanced. It is usually constant, dull, and aching in character, but may come in paroxysms. The extension of the cancerous growth freqently causes considerable distress, while attacks of renal colic may arise, owing to the passage of calculi or blood-clots from the kidney to the bladder.

Bloody urine has been noticed in about one-half of the recorded cases, while in some cases it was a prominent symptom throughout. When occurring suddenly, without any accompanying pains, and evidently from the kidneys, we may suspect a cancerous condition. Hæmaturia in renal cancer is apt to come on suddenly, is irregular as to time of appearance, and lasts a variable time; it usually occurs in considerable quantities, and is discharged without pain, except when calculi or blood-clots are present. When the cancerous growth is large enough to be detected by the touch, we find a swelling in the lumbar region above the iliac crest. The tumor may grow rapidly, especially in children, extending towards the pubis; it is generally immovable, elastic to the touch, and may be smooth or nodulated.

Gastric symptoms are frequently present, and vary in degree and kind according to the parts affected. Emaciation is rapid, and the debility and exhaustion are marked.

The duration of renal cancer is generally short, death usually occurring from exhaustion or, occasionally, from rupture of a bloodvessel.

The diagnosis of renal cancer is always difficult, and often impossible. When persistent pain exists in the renal region, with cancerous degeneration in other parts of the body, the presence of cancer in the kidney may be suspected.

When a tumor is located in the right side it may be distinguished from enlargement of the liver by the fact that renal tumors do not extend far up into the thorax nor prevent the passage of the hand between the ribs and the tumor when the patient is lying upon the back.

Distension of the ascending colon may lead to error in diagnosis, but attention to the variation from a dull to a tympanitic sound, the doughy "feel" of the swelling, the change in the shape by steady pressure, and the history of the case, will generally determine the condition. When a tumor of the kidney has been definitely determined, we may suspect cancer if we find that there has been a "rapid and irregular growth of the tumor, with an inequality and nodular character of surface and a varying consistency at different points."

The duration and course cannot be definitely determined. Cancers generally run a more rapid course in childhood than when occurring in those of a more advanced age, so that in children the duration may only be a few weeks or months, and in adults only a few years. The termination is always fatal.

Treatment.—The treatment can only be directed to sustaining the general health of the patient by a suitable regimen. Internal medication must be directed to allaying or removing concomitant symptoms as they occur.

ANOMALIES OF POSITION, FORM, AND NUMBER OF THE KIDNEYS.

These conditions are more interesting in an anatomical point of view than clinically, since many of them are not discoverable until after death. Thus the kidneys may be displaced and fixed in an immovable condition. This may be congenital or acquired, the latter being produced by the pressure of a tumor or enlargement of a neighboring organ.

The movable or floating kidney is of greater clinical interest. This abnormality may also be either congenital or acquired.

The symptoms connected with movable kidney may be slight or, in other cases, more urgent. There are unpleasant sensations of weight in the abdomen, with nausea and colicky pains. Fainting or collapse may occur should the kidney by any means become incarcerated.

The diagnosis is determined by the presence of a hard, smooth, movable swelling, having the shape of a kidney, located in one side of the abdomen, and which may be shoved up into the lumbar region. Often there may be noted a depression or flattening in the renal region, and over it a tympanitic sound. When the kidney is only slightly movable, or the patient fat, the diagnosis is more difficult. The same is true if the kidney should form adhesions.

The kidneys may also vary in form and number. They may be flattened or compressed by the pressure of other organs. They may adhere together by the apices, forming the horse-shoe kidney. A kidney has also been found with a double pelvis and but a single ureter. Supernumerary kidneys have been recorded, as also the single kidney. Many of these conditions may cause distress and even a fatal termination, especially in the case of the single kidney where the blocking of the single ureter would interfere completely with the functions of the kidney. These conditions are not discoverable during life and, as stated, possess only an anatomo-pathological interest.

Treatment.—The kidney, when displaced, should be reduced, if possible. This can sometimes be done by placing the patient upon the back and making upward pressure. The kidney should be retained in place by a pad and bandage. If the displacement threaten fatal consequences, laparotomy should be unhesitatingly practiced, and the difficulty or the kidney removed. Mechanical treatment will, however, in many cases prove unavailing. The irritation set up by an incarcerated kidney must be treated by rest and the appropriate remedy.

ANIMAL PARASITES OF THE KIDNEYS.

Several animal parasites have been found in the kidneys. They are in their order of frequency as follows:

1. Hydatids, containing the echinococcus hominis;
2. Strongylus or Eustrongylus gigas;
3. Cysticercus cellulosus;
4. Bilharzia hæmatobia or Distoma hæmatobium;
5. Pentastomum denticulatum;
6. Filaria sanguinis hominis.

The *echinococci* are developed from the tæniæ or immature condition of the tapeworm of the dog. The tæniæ are received into the digestive tract, and from there make their way to the kidneys. Their frequency depends upon the more or less intimate relation between individuals or large populations and the dog. The echinococcus is, therefore, more frequent in Iceland, and rarer in India and America; also more frequent in England, France, and Germany.

The kidney is the third organ in frequency affected with hydatids, the liver standing first, and the lungs second.

Hydatids usually appear in persons of middle age, and in men more frequently than women.

Pathology.—The parasite infects the left kidney oftener than the right, and very rarely both kidneys. The cysts are generally found in the substance of the kidney, occasionally beneath the capsule; they are round and fluctuating in character, and vary in size. When in the substance of the kidney, and extending outwards, the cysts reach a larger growth than when situated in the pyramids; in the latter location they generally burst into the pelvis of the kidney while the growth is small, and we may then have all the anatomical appearances of pyelitis. The cysts have been known also to perforate the bronchi, intestines or stomach, but a rupture into the peritoneum has not been recorded. In many cases the cysts remain unchanged. The cyst is made up of a firm, highly vascular, fibrous capsule, which is lined with a smooth, shining, laminated sac. It contains a clear watery fluid, in which float secondary or smaller cysts, or these may be attached to the walls of the original cyst. Cholesterine and hæmatoidine crystals, amorphous and crystalline phosphates, fat granules and globules, together with albumin, are found in the contained fluid. The echinococcus has a head similar to a tapeworm, having four suckers and a proboscis with a double row of hooklets. The kidney structure wastes more or less entirely away according to the size of the cyst. Adhesions often form to surrounding parts, or the organs may be displaced by the size of the cyst.

Symptoms.—The symptoms pointing to the presence of hydatids are not of a definite character, and the disease may run an indefinite and latent course. The only certain sign is the passage of the parasites with the urine. When a tumor has developed, it may produce symptoms similar to tumors of the kidneys from other causes. The swelling generally appears on one side and grows slowly. Very little pain or tenderness is present. The growth may reach the size of a head of a child, is round, and feels tightly distended.

When the cysts discharge into the pelvis of the kidney we have pains from the kidney along the ureter and, following these, the discharge of the vesicles with the urine, or there may be a milky detritus containing collapsed vesicles, hooklets of the parasite, or particles of laminated membrane. Strangury may be present on account of the blocking-up of the urethra by the vesicles. Blood and pus may also be found in the urine, and calculus has been observed associated with the hydatids.

Prognosis.—The course is indefinite. Spontaneous recovery may take place after the discharge of the vesicle. Death may occur through rupture of the sac into the lungs, from suppuration around the tumor, or from complications in the thoracic cavity in consequence of the size of the cyst.

The *Strongylus gigas* is very rare in man, although several cases are on record. It is found in the dog, horse, and other animals. The symptoms produced by this worm are similar to those produced by other foreign bodies, such as calculi and blood-clots. We have, therefore, hæmaturia, discharge of pus, pains in the renal region, and strangury. The parasite is found in the pelvis and calyx of the kidney, but its mode of ingress is not known. As results of the presence of the parasite, we find destruction of the kidney, dilatation of the pelves, and pyelitis.

The parasite resembles, externally, the large earth-worm. It differs in appearance from the ascaris lumbricoides by its deeper red color and its having six papillæ around the mouth instead of three.

Of the other parasites the *Distoma*, first described by Bilharz, is the most important. It prevails most frequently in warm countries, such as Egypt, Cape of Good Hope, etc. The symptoms produced are chiefly upon the bladder and ureter. By the blocking-up of the ureter with ova and urinary deposits, we may have pyelitis and pyonephrosis as secondary conditions. The hæmaturia of the endemic form which prevails in many hot climates is said to be due to the presence of this parasite. The female parasite is longer than the male, the body being flattened in the anterior, and cylindrical in the posterior, portion. The head has two suckers, which are situated close together. It is supposed to gain access to the intestines through the use of drinking water, and penetrates from here into the veins of the abdomen.

The remaining parasitic forms are very rare and need not be further referred to in this connection.

Treatment.—Practically nothing can be done in the way of treatment in connection with these parasites. Large doses of mercury, turpentine, and other drugs, have failed to give relief. When the parasites are known to prevail, careful prophylaxis should be adopted. Medicines may have some influence in allaying or keeping in check the irritation produced by the parasites. If perchance they should be discharged from the system with the urine, then our remedies will aid very much in restoring the parts to normal conditions, provided the destruction of tissue has not been too extensive.

There may be cases so clearly made out that extirpation of the kidney would be correct practice.

B. DISEASES OF THE URETERS.

BY J. G. GILCHRIST, M.D.

The function of the ureters being, to a very considerable extent, confined to a passive conveyance of the renal excretion to the bladder, and their anatomical relations, both of contiguity and continuity, with the kidneys and the bladder being of the most intimate character, it is very rarely the case that morbid affections of the ureters are presented to the medical practitioner, at least affections unassociated with analogous morbid processes either in the kidney or bladder, whether primary or secondary. There are many affections of the kidney, without doubt, which extend into the ureters; so there may possibly be vesical troubles which also implicate these organs, yet the graver malady almost always obscures the lesser, if such it may be considered, largely on account of the greater prominence of the symptoms. In fact, the situation of the ureters being so deep in the pelvis, inaccessible to instruments of diagnosis, and the predominance of either vesical or renal symptoms even when the ureters are primarily diseased, renders early recognition of morbid changes practically impossible. Moreover, there are many instances of congenital malformations of the tubes, impossible of recognition during the life of the individual, and thus still further embarrassing what was already sufficiently perplexing. Inasmuch as disease of the ureters, as associated with renal or vesical morbid action, has already received attention in the proper places, our present inquiry will be confined to conditions which may arise in these organs, or which are peculiar to them.

CONGENITAL MALFORMATIONS.

Cases have occurred of almost every conceivable form of abnormality, some of them appearing almost inconsistent with a continuance of life. Thus the ureters have been impervious, even entirely absent, the urine finding entrance to the bladder by some unusual channel, or perhaps flowing into the rectum or vagina. In other cases there has been a single ureter in its lower portion, the upper part being double. Frequently the ureter opens from the pelvis of the kidney in such a manner that a very acute angle is formed, which has the effect of a valve, and materially impedes the flow of urine. According to Roberts (*Reynolds' Pract.*, iii., p. 742), the "most common malformation is the presence of two ureters in connection with one kidney, which may be associated with a divided pelvis, and the two ducts may open separately into the bladder, or join before they reach this viscus." These abnormalities, it may be readily conceived, have the effect to greatly embarrass diagnosis, particularly as there are rarely opportunities during the life of the individual to detect them.

INFLAMMATION OF THE URETER.

Inflammation of the ureter is always, there is reason to believe, either due to traumatism or to an extension from the kidney or the bladder. There is no reason why the tissues of which the duct is composed should be less liable to inflammation than other tissues, yet the function of the part and its protected position very materially reduce the probabilities of idiopathic primary inflammation. Whenever a diagnosis has been made, almost invariably traumatism has been found an undoubted cause, unless the inflammation is secondary, an extension from near parts. Should inflammation originate in the ureter, it would speedily extend upwards or downwards, and to some extent the significance and importance of the process would be lessened. And yet, a glance at the consequences of tissue-changes in this important part will at once show the urgent necessity existing to promptly cure such cases. To this end an early and accurate diagnosis is important, a task in itself exceedingly difficult of accomplishment.

The first and chief difficulty in the way of recognizing the condition in an early stage is the neglect of the patient to present himself promptly upon the appearance of symptoms. This is unavoidable in a large majority of cases, as the first symptoms are not of a character to attract attention. Considering the disease as primary and localized, without any reference to other organs which often become implicated, these indications are as follows: There is a vague uneasiness in the pelvic region, rarely amounting to a pain, with some rise of bodily temperature. At times the constitutional irritation may rise to the extent of fever. The urine may not be diminished in quantity (although it usually is), but it is turbid, flocculent, or otherwise abnormal. Careful clinical study may show no abnormality elsewhere, and we may be led to refer the trouble to the ureter. The urine is examined; it is found more or less purulent, mucous, containing epithelium and, perhaps, blood: there may, or may not, be any change in the urea or other constituents. The sound or catheter has shown the urethra and bladder to be healthy; careful examination reveals no morbid action in the kidneys. The disease being evidently in the urinary tract, it *must* be, therefore, in the ureters. Thus a diagnosis is reached purely by the method of exclusion; it cannot be the urethra, bladder, or kidney, therefore it must be the ureter. From the fact that the epithelium from the bladder, ureter, and kidney are of the same morphological characters, when kidney-affections and bladder-diseases are positively excluded, the appearance of such epithelium in the urine points almost unerringly to the ureter.

In the case of women, the urethra can be dilated, and the ureters directly inspected; in the case of the male, such a procedure is impossible. Many experiments have been made with a view to temporarily close one ureter, in order to determine through which one the abnormal urine flowed. Dr. Silberman, in the *Medical Record*, furnishes a method which is thus summarized (*Weekly Med. Rev.*, x., p. 106): "Dr. Silberman's instrument consists of a catheter (No. 18 French) provided with a large opening, 1¼ inches long, upon the side, and several small holes at its extremity. The instrument having been introduced, the eye being covered so as not to injure the walls of the urethra, a smaller canula is passed through. This small tube is provided with a rubber ball at its extremity, which, when in position, lies directly in the eye of the catheter. The instrument being so turned that this part lies against the mouth of the ureter, Mercury is forced through the inner tube, dilating the rubber ball, and effectually closing the orifice." The instrument has been used, it is said, a number of times successfully, always, however, with reference to kidney diseases, to determine the side furnishing the abnormal urine. Its use would facilitate, possibly, a diagnosis in the present instance.

The consequences of acute inflammation of the ureter are various and important. Should there be only mucus as an exudate, resolution is probable. Should pus be found, however, the gravest consequences may ensue. The same may be said as to blood. In the two latter conditions there is such alteration in, or destruction of, the tissues of the part that cicatricial constriction, or even adhesion of opposite walls, may occur. This would result in obstruction of the duct, accumulation of urine interior to it, distension of the kidney, and the grave consequences incident thereto. To say nothing of the results of the extension of the morbid action to the kidney, the changes in the ureters themselves may be of such a character that life is jeopardized. Fortunately, so far as our knowledge goes, the majority of cases of inflammation of the ureters terminate in resolution, the intensity being low and the physiological conditions being favorable to speedy recovery.

The causes of localized inflammation are almost uniformly traumatic, such as the passage of renal calculi, arrest of the same bodies, or injuries from without. There are few, if any, circumstances that could result in localized idiopathic inflammation. The causes being so uniformly traumatic, unless there is some constitutional dyscrasia, the inflammation subsides as soon as the irritant is removed, unless there has been a positive laceration of the lining membrane, the foreign body passing through was much delayed, or the irritation frequently repeated. We are all familiar with the soreness in the course of the spermatic cord remaining after the passage of a renal stone; it is caused by the inflammation of the ureter. Occasionally a succession of such attacks occurs, following each other quickly; these cases always suffer more and for a longer time from the pain referred to. The urine of such patients should always be examined, and if pus is found, or blood in any quantities, a condition of the ureter may be suspected which calls for prompt treatment.

Treatment.—Under the circumstances a selection can be made from a very small list of remedies. In idiopathic cases *Aconite* would first attract attention. Should there be much pus, *Mercurius* would be indicated. The cause being traumatic, *Arnica* will nearly always fill all the indications. Should the disease extend to the kidney or bladder, or originate in one of these organs, and thence extend to the ureter, the indications for remedies must be sought under the appropriate heads.

OBSTRUCTIONS OF THE URETER.

The ureter may become obstructed in various ways, the results, however, being practically the same in all cases. A renal calculus may become impacted in the canal. Pus or mucus may exceptionally form a plug. Ulceration, or some form of destructive morbid action, may produce a stricture by cicatricial contraction, or adhesion of opposite walls. Whilst the effects are identical, yet the prognosis varies considerably in these different cases; hence a cursory study of them may be useful.

In the majority of cases a renal stone, sufficiently large to give rise to symptoms, is too large for the capacity of the duct. Even when not too large to pass through an insensitive tube of the same calibre, they are so often angular in form that the mucous coat is irritated if not wounded, and the muscular coats are stimulated thereby to a more or less spasmodic contraction, resulting in a spasmodic stricture, firmly embracing the foreign body. In the greater number of cases this always occurs, but no permanent injury results. The urine accumulates behind the obstruction and, by distending the canal, and at the same time insinuating itself between the calculus and the soft parts embracing, almost invariably expels the obstruction into the bladder. In exceptional cases a far different and less desirable result is attained. Either from the great size of the calculus, its form, or from the intensity of the inflammation producing great swelling of the part, the ordinary natural forces are inadequate to remove the obstruction. The calculus becomes firmly fixed, the ureter enormously dilated, and the integrity of the kidney itself is threatened by the distension of the pelvis and the choked condition of the tubules. The stone may become encysted, and if life is spared, the kidney on that side is necessarily lost. In other cases ulceration occurs, and the stone passes out into the bladder, the rectum, or the pelvic cavity. In the two former, a permanent fistula is likely to form, resulting in a new channel for the discharge of the urine; in the latter, pelvic cellulitis, with perinæal, or other, fistula is almost certain to occur should life itself not be destroyed. An opening into the bladder or rectum will often save the kidney, and hence the life of the patient.

Treatment.—This must be largely expectant. If the obstruction exists for some length of time, and there is reason to fear that it may become permanent, an effort should be made to find the calculus by digital exploration of the rectum or vagina, as the case may be. Should the search be successful, it would be proper to open the ureter and turn out the offending body. I am not aware that this has ever been done, but it is recommended as a feasible and proper operation, of course being reserved for desperate cases. In cases of less severity, where the obstruction has continued for some time but yet does not threaten to become permanent, remedies may and *can* do much. *China* is useful in most cases, probably from the increase in urine it promotes. *Hypericum* is a sovereign remedy when the pain and irritation are excessive, evidently causing a spasmodic contraction of the muscular coats. Judging from the clinical reports, *Muriate of cocoaine* should be useful in similar cases. It should be injected above the point of lodgment, as experiments seem to show that the anæsthesia which it produces proceeds downwards toward the peripheral nerve terminations.

The *second class* of cases, in which pus or mucus closes the duct, cannot, it would seem, be diagnosticated during life. Pus or mucus being found in the urine, excluding the kidney and bladder as a source, an obstruction of the ureter might be made out, but there are no means by which its nature could be determined. It is true that ulceration, or any morbid action that would give cicatricial contraction, must be chronic in its character and progressive; it would not be sudden and acute. Furthermore, in either case, there would be antecedent inflammation. In proportion as the obstruction was suddenly produced and complete, would there be ground for a suspicion that it is due to some morbid product.

It would seem almost impossible that an obstruction of the character under observation should prove anything greater than a temporary inconvenience. Coming from the upper portion of the duct, and lodging near the vesical termination, it would, probably in ninety-nine cases of a hundred, soon be carried through by the urinary accumulation behind it. Yet, inasmuch as an excretion sufficiently profuse to furnish material for such a plug must be an accompaniment of an intense inflammation, the presumption is that the whole canal is involved; the mucous membrane being smaller gives a diminished capacity to the duct, and there is likely to be an early implication of the kidney, furnishing more or less urinary suppression. Under circumstances such as these it can readily be conceived how such a clot or plug might form and lodge, take on a more or less perfect organization, and thus constitute a permanent obstruction.

Treatment.—This must be prophylactic and expectant. *Prophylactic* by hastening as much as possible the cure of the inflammation, and thus, by lessening the exudate, diminish the opportunity for plugging; *expectant*, in seeking to increase urinary excretion with a view to forcing the plug out by the combined dilatation of the tube and by the pressure from the imprisoned urine.

The *third form* of obstruction is from cicatricial contraction or union of opposed walls of the ureter. The conditions are similar, to a certain extent, and may be treated simultaneously. They are the common result of inflammations in which there has been tissue-loss, and they derive their importance from the well-known property of contraction in scars, and the union of opposing granulating surfaces. The inflammation must be of a high grade and intense, or else traumatic, and thus a clue may be supplied which will be useful in diagnosis. An intense inflammation of a ureter, furnishing in the urine blood, epithelium, and other tissue elements, may be safely set down as ulcerative. A progressive obstruction in such a case can be safely attributed to either cicatricial contraction or union of opposing surfaces, and measures may be taken to cure or modify the condition.

Treatment.—The treatment in these cases is entirely expectant in a sense; we have no means by which the actual state of affairs can be determined, although something might possibly be attempted surgically, taking the distended duct interior to the obstruction as a guide. *Silicea* is the one remedy of promise. In stricture it can do much on general principles, but should the stricture be impermeable, an actual occlusion, the kidney will be destroyed before the remedy can produce appreciable effects. The condition of cure is, therefore, a stricture of large calibre, permeable, as would be said of urethral strictures.

MORBID GROWTHS IN THE URETER.

As is the case in all ducts and canals in which a muscular coat underlies a mucous surface, morbid growths are not uncommon in the ureter. Tumors of various formation have been found, *post mortem*, chiefly polypoid in character. They spring, as such tumors usually do, from the submucous or muscular tissue, and often partially separating from their base assume the common characteristics of polypoid growths elsewhere. There are no symptoms which are reliable, or which would direct attention to the true cause of the uretal obstruction and consequent renal difficulty; the indications are simply those of obstruction. I believe a case is described in one of our books (the reference is lost), in which such a tumor, with an unusually long pedicle, had passed into the bladder, and formed the nucleus for stone. If I remember correctly, it is the only occurrence of a diagnosis made during life.

CALCULUS IN THE URETER.

Urinary calculi are found in the ureter, oftener originating in the kidney and becoming arrested in this passage on their way to the bladder. These have all the effects of true uretal calculi, of course, but are strictly to be considered as renal, inasmuch as their presence in the ureter is not in consequence of any abnormality in that organ. As occurs throughout the urinary tract, wherever a nucleus is furnished, conditions are favorable to the formation of stone. Hence a drop of blood or mucus, or of pus, or a small granule from the kidney, may lodge in the ureter and form the nucleus for a stone. The symptoms are those of obstruction in every particular, and it is almost, if not quite, impossible to differentiate. The fate of the calculus thus formed is as given in a preceding paragraph, viz., encystment and destruction of the kidney (or the individual), or ulceration and escape into the bladder, the rectum, the pelvic cavity, or the vagina.

Concluding Observations.—It is very apparent that while the various morbid processes involving the ureters, whether primarily or secondarily, are of the gravest character, the symptoms attending or produced by them are exceedingly obscure and often quite insignificant. The point of greatest interest, and interest attaching to all the processes referred to, is the possibility of the duct becoming occluded or constricted, and thus preventing the proper escape of the renal excretion. The consequences of such a catastrophe cannot receive attention here. Not only is the integrity of the kidney imperiled, but the life of the individual is placed in imminent danger. The occurrence of hydronephrosis may be the first indication that the ureter is occluded; aspiration, or similar treatment, may palliate the condition, but a restoration of the potency of the ureter or an artificial opening is *sine qua non*. Hitherto, I believe, surgery has attempted little, if anything, to afford relief in the various affections of the ureters. It seems probable, however, that means will yet be found to save a kidney by restoring an impervious or constricted ureter. This, however, is a question for the surgeon; the physician must endeavor to recognize uretal diseases early in their course, and attempt to prevent these later and serious conditions.

C. DISEASES OF THE BLADDER.

BY F. E. DOUGHTY, M.D.

CYSTITIS ACUTA—ACUTE INFLAMMATION OF THE BLADDER.

The various forms of the inflammatory process may attack the bladder, and involve one or more of the structures of which it is composed; to designate the fact many terms are employed.

In the great majority of cases it is the mucous membrane of the bladder that is attacked by simple inflammation, and to express this condition the term cystitis is employed. If we desire to designate the *character* of the inflammatory process, certain qualifying terms are added, as acute or chronic cystitis; catarrh of the bladder, or cystitis mucosa; croupous, diphtheritic, or gonorrhœal cystitis. Again, if the morbid process involves the submucous or muscular or subserous tissues, either primarily or, as is more commonly the case, by extension from the mucous membrane, then the qualifying terms are: parenchymatous, interstitial cystitis, or cystitis totalis; submucous or subserous cystitis. If it is the serous covering of the viscus which is affected, it is indicated by the term epicystitis; or should the structures around the organ be the location of the inflammation, the fact is expressed by the term pericystitis.

Ætiology.—The causes of acute cystitis may be divided into five classes:

I. Traumatic and chemical.
II. Extension of inflammation from neighboring parts.
III. Exacerbation of existing chronic inflammation.
IV. Drugs and improper food.
V. Cold, and no obvious cause, but generally attributed to the gouty or rheumatic diathesis.

I. Traumatic and chemical. Direct injuries, such as wounds of the bladder or contusions of the perinæum and hypogastrium from falls or blows; the presence of calculous concretions, injury done by the careless or improper use of instruments in the bladder; foreign bodies introduced into the viscus and remaining there; over-distension from retention of urine, due to stricture, coma, paralysis, acute febrile disease, combined with altered urine; pressure of a tumor, sudden displacement of the uterus; contusions and injuries during prolonged and difficult labors, especially those requiring instrumental aid.

Chemical causes include irritating injections introduced to arrest hæmorrhage, or finding their way into the bladder when employed for the cure of urethritis.

II. Extension of inflammation from neighboring parts. Pelvic peritonitis, cellulitis, uterine and vaginal cancer, vaginitis, metritis, perityphlitic abscess, or abscess of other organs opening into the bladder, or perforation of a fœtal sac; gonorrhœal inflammation and stricture of the urethra, prostatitis, cancer and tubercle of the prostate; and, exceptionally, an inflammation of the mucous membrane of the pelvis of the kidney, whether of spontaneous origin or set up by the presence of calculi which may be transmitted along the ureter to the bladder.

III. Exacerbation of existing chronic inflammation. Cold, the result of getting wet, not unfrequently calls into activity a subacute or chronic condition of inflammation; the rough use of instruments; spasm or neuralgia of the bladder; and a diphtheritic patch of membrane; or an exaggeration of simple congestion due to pregnancy.

In this category we would include an altered condition of the urine, although by some writers this would be classified under the chemical causes. We do so because we believe that no known abnormality of the urine will excite acute inflammation in a perfectly healthy bladder, however active it may be in giving rise to trouble in a bladder already affected by chronic congestion or hyperæmia.

The alteration in the urine to which we refer is the formation of the carbonate of ammonia, following upon the development of a hyperæmia or congestion of the mucous membrane of the bladder, the result of partial retention of urine due to stricture, enlarged prostate, or paralysis of the bladder. As a result of the congestion or hyperæmia of the membrane, there will be an excessive secretion of mucus; this substance, by its catalytic action and the alkali which it contains, decomposes the urea, changing it into carbonate of ammonia, precipitating the amorphous phosphates and forming, with the phosphate of magnesia already present, the ammonio-magnesian, or triple, phosphates. The carbonate thus formed is exceedingly irritating to the mucous membrane, and so provokes a more profuse secretion of mucus or, later, of pus, which in turn decomposes the urea and develops more of the carbonate. Thus they react upon each other, causing more and more irritation until an inflammatory stage is reached.

It is to be borne in mind that the pus or mucus may come originally from the upper urinary passages or from an abscess which has opened into the bladder. Once having gained entrance into that viscus, it may by its presence irritate the lining membrane, and so start the train of changes just enumerated.

The alkaline decomposition of the urine has also been attributed to the presence of bacteria introduced upon a catheter or gaining access to the bladder in some other way.

IV. Drugs and improper food. Cantharides is capable of exciting a violent inflammation of the bladder; whether applied to the surface as a blister or administered internally, its effects are the same. The cantharidine is absorbed and is excreted by the kidneys, and seems to excite its characteristic effects when brought into direct contact with the vesical mucous membrane by the urine. Many times it provokes only active irritation and hyperæmia, stopping short of actual inflammation. Similar effects may result from the use of turpentine, arsenic, chlorate and nitrate of potash.

Improper food is probably unable to excite an acute cystitis in a healthy bladder, but it may call into activity a sub-acute or chronic state. Such articles are: stimulating condiments, onions, and asparagus. So also the intemperate use of stimulating drinks, especially if of a bad quality, or new, imperfectly fermented beer.

V. Cold, rheumatic or gouty diathesis. That the effects of cold are capable of exciting an acute inflammation in a bladder previously free from morbid action is wholly denied by some.* Yet, the majority of writers agree that a chilling of the general surface by sudden transitions from heat to cold, or exposure of the abdomen and feet to cold and moisture, or the repulsion of cutaneous eruptions, especially in rheumatic or gouty subjects, are sometimes productive of cystitis.

Whether the rheumatic or gouty habit *alone* can give rise to a cystitis, we are not prepared to admit. That cases do occur for which no adequate cause can be discovered cannot be doubted, and if the subject happens to be of one or the other of these diatheses, it seems very natural to ascribe the urinary disturbance to that cause, without, perhaps, sufficient reason.

The causes of inflammation of the deep cellular structures of the bladder are nearly the same as those which produce acute inflammation of the lining membrane.

Pathology.—The morbid appearances found in acute cystitis are such as are met with in similar structures when inflamed.

The changes may involve the entire mucous membrane, or occur in irregular, circumscribed patches or streaks. Any portion of the organ may suffer, but the morbid changes are found most frequently at the neck and bas-fond.

In cases of moderate severity the onus of the disease falls upon the mucous membrane, which is swollen and relaxed, and presents a bright or deep-red color over its whole extent, or in patches, or in a punctiform manner, while ecchymoses may be present. The surface of the membrane is covered by a thick muco-purulent secretion of a pale straw, grayish, drab, or greenish color, or even by a pseudo-membrane.

The tops of the rugæ will be found more or less denuded of their epithelium, and pus and loose cells will be found in the sulci between the folds. When the inflammation has been severe and has existed for some time, more swelling of the membrane is observed, and its folds project more markedly, almost all its epithelial covering is lost, and the sub-mucous tissues are thickened.

In some cases, particularly those caused by retention and over-distension, a part, or even the whole, of the lining membrane may be thrown off. This is especially liable to occur when the retention and over-distension are caused by accidents of the puerperal state, or during delivery. This separation does not exist at the vesical neck. One of the most serious results of intense vesical inflammation is gangrene. The organ becomes distended from paralysis of its muscular walls, and its contents are found to be a brownish colored fluid, consisting of decomposed urine, shreds of broken-down mucous membrane, altered blood, pus, and epithelial elements and urinary salts.

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* Genito-urinary Diseases. Van Buren and Keys, p. 241.

The membrane itself is soft, pultaceous, and its color varies from a deep charred black, red, livid, or purple, to a dark greenish or greenish-yellow hue. The submucous connective and muscular tissues are softened, discolored, and infiltrated with putrid, bloody pus.

With these evidences of acute action may be found condensation and thickening of the membrane or of the other parietal structures, colored in red, purple, gray, or slate tint, ulceration, trabeculation, and sacculation, all indicating an older chronic state. It is often very difficult to tell whether the inflammation has resulted in ulceration or not; but if the pain and irritation keeping up the desire to urinate continues for a longer time than usual, and is excessive, while at the same time blood and shreds of tissue are found in the urine, it is highly probable that ulceration has taken place. Such ulcers have for their favorite site the regions of the neck and bas-fond, and from there may spread over a greater or less extent of the mucous membrane. They vary in shape; sometimes they are circular, with well-defined margins, sometimes irregular in outline, with ragged borders. Occasionally the ulcerative action will perforate the walls of the viscus and permit extravasation of urine into the abdomen; or adhesive inflammation is excited, binding the bladder to neighboring organs, thus preventing an escape of urine; or if the adhesion takes place between some portion of the intestinal tract, the urine will escape into the gut, and the contents of the intestine will gain access into the bladder.

In severe cases of inflammation of the bladder suppuration may occur in the sub-mucous connective tissue or between the muscular and serous tunics. The inflammation may originate in these structures, but usually occurs by extension from the mucous lining. There is no evidence that the muscular layer is ever primarily invaded. When pus forms, it may be diffused through the connective tissue of the coats of the bladder, which is rare; or it may form abscesses.

Of necessity, such purulent collections are of moderate size, seldom being larger than a pea, filbert, or pigeon's egg. They may occur in any part of the organ, but they are most frequently observed at the vesical neck. Usually, only one such abscess is met with; occasionally, as many as five or six. Such depots of pus, after existing an indefinite length of time, discharge, and commonly do so into the bladder.

In violent attacks of cystitis the inflammation may extend to the ureters and thence to the kidneys, deranging their function or exciting pyelitis; or the prostate gland may become involved.

In gonorrhœal cystitis the morbid action is confined to the region of the vesical neck, and does not attack the body of the organ.

Croupous and diphtheritic inflammation may be regarded as one, though in the former the exudation takes place *upon* the mucous surface, and the false membrane, while moderately adherent, can be readily separated though it may cover the entire interior of the viscus like a mould. Such casts, becoming detached and covered with phosphatic deposits, may cause retention of urine, and may be expelled during life, when they are liable to be mistaken for the mucous membrane itself or, in parturient women, even for the placenta. In diphtheria of the bladder the exudation infiltrates the sub-epithelial connective tissue. The mucous membrane thus infiltrated may be thrown off as a complete cast of the bladder, leaving perhaps abrasions or deep ulcerations. Croupous inflammation is very rare as an idiopathic affection, but it sometimes occurs in connection with the same condition elsewhere. As a secondary affection it occurs in cholera, typhus, the exanthemata, and pyæmia, or from mechanical causes.

The membrane is of a grayish, drab, brown, greenish, or red color; sometimes it covers the entire internal surface of the bladder, and even to such a degree of thickness as to diminish the capacity of the viscus. Usually, however, it is met with in patches, from an inch to two inches in diameter; or it may appear as small clots, or as an amorphous mass. It may extend into the urethra and cause retention; or into the ureters and block them up, causing fatal uræmia.

Symptomatology.—Acute cystitis usually commences in a sudden manner and runs a rapid course, unless it supervenes upon a chronic form. The first symptom is a dull, uncertain, deep-seated uneasiness in the region of the bladder, which rapidly augments to absolute pain, and extends to the neighboring parts; this is soon followed by frequent and irresistible desire to micturate, only a small quantity of urine being voided with each effort, which is attended with violent straining, distressing spasm, and a burning or scalding at the neck of the bladder and along the course of the urethra. These two symptoms soon acquire a distressing degree of severity. The hypogastrium is distended and painful to the touch, while the body is bent forward, and the limbs drawn up, in order to relieve the tension of the abdominal muscles. Pressure on the perinæum is painful, and if the posterior wall of the bladder is examined by a finger passed into the rectum or vagina, it will be found extremely sensitive, and the distress spontaneously complained of will be increased. As the disease advances, the desire to empty the bladder becomes more and more urgent and uncontrollable, sometimes almost incessant day and night, accompanied with most violent vesical tenesmus and bearing-down, almost equal to what occurs in child-birth. The pains shoot into the testicles and penis, to the inguinal and sacral regions, down the thighs, and into the perinæum.

During the early stage the pain subsides after the urine has ceased to flow, to return again when a small amount of urine has descended into the bladder; later, when the mucous membrane becomes intolerant of the contact of the urine, the pain is almost, or quite, continuous and agonizing, and though the efforts to expel the urine are almost without intermission, only a little is discharged. The bladder is never entirely freed of its irritating contents, which gradually increases in amount until at length the organ rises into the hypogastric region as a globular, elastic tumor. The seat of the morbid process influences somewhat the character of the symptoms. If the inflammation affects chiefly the neck of the bladder, excessive pain, with a sense of weight or fulness, is experienced in the anus and perinæum; there is obstinate retention of urine, with an incessant desire to void urine, and severe burning or scalding is experienced along the urethra. When the anterior wall of the organ is affected, there will be more marked pain and tenderness in the supra-pubic region, and less pain referred to the neck of the bladder; and the frequent desire to urinate and the tenesmus are less pronounced. If the bas-fond is chiefly involved, the rectal symptoms will be proportionately prominent.

The urine, at first acid and clear, soon becomes turbid, high-colored, and alkaline, containing an excess of mucus and epithelial elements and some pus evenly distributed through the fluid at first, subsequently as stringy mucus, while more or less blood will be present according to the intensity of the inflammatory action.

The specific gravity will vary but little from the limits of health, unless much fever is present, when it may rise to 1030.

If the urine is allowed to stand for some little time, a white or blood-tinged sediment soon settles to the bottom, which, on microscopical examination, shows numbers of white blood-corpuscles (mucus or pus cells), red blood-cells, fibrillæ of mucus, bladder-epithelia, shreds of tissue (if ulceration is present), and, if the urine has suffered decomposition, the amorphous and triple phosphates. The odor is normal, unless decomposition has taken place, when it will be ammoniacal; or, if the intensity of the inflammation is great, and sloughing has occurred, it will have a fœtid odor.

Chemically, albumin will be present in proportion to the amount of pus and blood, and this is most marked in cystitis produced by cantharides. It is a matter of no little difficulty to decide whether the albumin in purulent urine is derived entirely from the pus or is a symptom of coexisting kidney disease. The quantity of albumin derived from liquor puris is comparatively small, and if a large amount should be present it would indicate serious disease of the kidneys. While urine containing pus may have either an acid or an alkaline reaction, still if found in connection with the former it generally has its origin in a pyelitis; if with the latter, in a cystitis.

A chill sometimes ushers in the disease, though fits of shivering are more common and are followed by more or less fever and constitutional manifestations according to the severity of the attack. The febrile movement is characterized by the usual symptoms of such condition; hot and dry skin; quick, hard, small, frequent pulse; coated tongue; loss of appetite; nausea or vomiting; thirst; restlessness and agitation.

If the disease pursues an unfavorable course, the strength rapidly declines; the surface is bathed with a clammy perspiration, and has a urinous odor; the mind wanders; hiccough with jactitation supervenes, the extremities become cold, the features contracted, finally coma develops, and death closes the scene about the eighth or tenth day. In mild cases there may be a total absence of constitutional symptoms.

Thus far we have considered inflammation of the mucous membrane of the bladder chiefly. When others of the anatomical structures are affected, especially the submucous tissue, the symptoms are even more severe; for when the membrane only is involved, the inflammatory exudates, being thrown out on the surface, are readily removed. The symptoms presented in cases of parenchymatous inflammation of the bladder are seldom sufficiently pronounced to lead to a positive diagnosis, unless the presence of an abscess can be detected by manual examination.

Pain and distress, with frequent and difficult urination, such as we have described as existing in acute cystitis, will be complained of; but usually the burning sensation in the course of the urethra and perinæum will be absent or slight.

Rigors generally usher in the disease, and severe constitutional symptoms develop rapidly. If the inflammation increases, pains in the bowels and rectum, with tenesmus, develop, and the patient rapidly sinks and dies. If the inflammation or abscess is in the neighborhood of the vesical neck, retention of urine may be produced either by the swelling or the bulging of the abscess occluding the urethra.

Should the parts higher up, in the neighborhood of the orifices of the ureters, be affected, the openings of these tubes may become closed, and the urine, failing to escape into the bladder, rapidly distends them. In the great majority of cases, interstitial abscess points inwards towards the cavity of the bladder, into which the pus finally escapes. With the rupturing of the abscess the pain and frequency of micturition diminish, as do also the general symptoms. Gradually the cavity of the abscess contracts and cicatrizes.

Such a favorable course may not, however, be followed. The abscess, whether submucous or subserous, may rupture into the cellular tissue surrounding the bladder, giving rise to the well-known symptoms of urinary infiltration, producing intense congestion, inflammation, and new purulent formations which may rupture into the rectum, vagina, or perinæum, etc.

Rarely the primary abscess opens into the peritoneal cavity and produces a rapidly fatal peritonitis. If we have to deal with adhesive pericystitis, whether primary or, as is more commonly the case, from extension of an inflammatory process from neighboring parts, the febrile symptoms are unimportant, and there are scarcely any symptoms due to pressure.

The bladder, however, from adhesions, is much less able to contract, producing difficulty in voiding the urine or even complete retention.

Pericystic abscess due to typhus, pyæmia, or grave exanthema or traumatism, must not be confounded with that resulting from an extension of inflammation originating in the bladder.

Diagnosis.—In well-pronounced cases usually no difficulty attends the recognition of acute cystitis.

The disease with which it is most likely to be confounded is acute prostatitis, with which it is sometimes associated. In mild cases of cystitis care is necessary to distinguish it from other conditions that cause similar symptoms, such as stone in the bladder, spasm and neuralgia of the vesical neck. In cases of stone the history will afford great aid, and the pain will be felt chiefly at the termination of the act of micturition, while in cystitis relief is afforded by the emptying of the bladder. In stone the sudden interruption of the stream of urine and the appearance of considerable blood in the urine are guiding symptoms, while the employment of the searcher removes all doubt. Over and over again have we been consulted in cases of supposed cystitis, when an examination has disclosed the presence of a calculus. In neuralgia and spasm the urine remains unchanged unless the condition has existed a long time, and has provoked a degree of cystitis, and the pain, tenderness, and urgency are decidedly less, or entirely absent, when the mind is deeply interested and sleep is undisturbed.

We would also call particular attention to the error not unfrequently made of mistaking pyelitis for cystitis. Dr. Heitzman, of New York, places the greatest reliance on the character of the epithelia found in the urine, as affording unmistakable evidence of kidney disease. It is our opinion that for the general practitioner this means of differentiation is of little value, for the transitional forms of epithelia from the bladder are very likely to be mistaken for normal epithelia from the renal pelvis.

In acute prostatitis there is less vesical and more rectal tenesmus; the perineal pains are more marked and aggravated by movement, by defecation, etc.; retention of urine is more prone to occur; and lastly, a rectal exploration with the finger discovers the gland large, hard and tender. There are no characteristic signs by which a differential diagnosis can be made between an acute inflammation of the lining membrane of the bladder and an inflammation affecting the deeper structures; many surgeons say that it is impossible to differentiate them.

Pericystic formations of pus, as evinced by pain, swelling, doughy œdema, etc., can sometimes be recognized when situated between the front of the bladder and the symphysis pubis; or posteriorly, by an examination by the vagina or rectum.

There are no distinctive features by which croupous or diphtheritic cystitis can be distinguished.

Prognosis.—Acute cystitis is to be regarded as a serious disease if the attack is severe. In mild cases a favorable termination may be anticipated in about six or eight days. If resolution does not take place by this time, the tendency of the disease will be to assume an ulcerative, suppurative, or gangrenous form, or to run into a chronic type, in all of which conditions the prognosis is very grave. By judicious treatment life may be prolonged for some time, but a cure can hardly be expected, for the bladder is in a condition incompatible with the performance of its normal function, and the morbid process has extended up the ureters and involved the kidneys.

Treatment.—Absolute rest in bed is of the first importance, and if the exciting cause has been anything that can be removed, it should receive immediate attention. The patient should be directed to resist, as much as possible, the urgent calls to urinate, and restrain from adding to the involuntary tenesmus by voluntary effort, as the powerful contractions of the muscles of the bladder, aided by those of the abdomen and diaphragm, tend to irritate and bruise the vesical neck, and so increase the difficulty. Since this condition cannot be wholly controlled by volition, or immediately by even the appropriate remedy, we advocate, in severe cases, the exhibition of some anodyne, especially Opium, in the form of rectal suppositories, and in sufficient amount to render the patient comfortable, but no more; the drug should not be employed at all if it can be avoided, for it has a marked effect upon the renal excretion, rendering it somewhat irritating to the bladder.

All condiments, rich dishes, gravies, pastry, liquors, beers, wines, as well as tea and coffee, should be strictly interdicted. Milk should enter largely into the bill of fare; indeed, it would be well to make it the exclusive diet, if possible. If it prove too heavy, the cream may be removed. Moderate quantities at short intervals are better than large draughts at long intervals.

Therapeutics.—**Aconite.**—Rheumatic cystitis; sensitiveness over the region of the bladder, with feeling of tension and heat; burning at the neck of the bladder when urinating, or between the acts of micturition; violent burning in the bladder; frequent, painful, urgent desire to empty the bladder, with vesical tenesmus; the urine flows drop by drop, or in a feeble stream, and is scanty, scalding, and highly colored or mixed with blood; burning distress in the urethra; faint feeling while urinating.

Apis mel.—Particularly useful in cystitis from the use of Cantharides, Camphor, or other drugs; burning in the urethra before and after urinating; irritation at the neck of the bladder, with tenesmus while voiding the urine; frequent burning micturition. Urine of pale straw-color, or scanty and bright-red, with brick-dust sediment; worse at night; frequent, sudden pain in the course of the ureters.

Belladonna.—Hypogastrium painful to pressure; frequent painful urination; urine hot, scanty, and dark-red; urine at first clear, but soon becomes turbid on standing, and deposits a red, bran-like sediment.

Cannabis sat.—This drug and Cantharides are closely related and have many symptoms in common, but the action of the latter is much more intense. Cannabis is particularly useful in gonorrhœal cystitis.

Cantharides.—The remedy most frequently indicated in acute cystitis. Constant desire to urinate, with inability, or difficult emission of a few drops; violent vesical tenesmus during and after micturition; burning, scalding pain at the neck of the bladder; pains extending from the vesical neck to the glans penis, or into the perineal or sacral regions, or to the testicles, which are retracted; tenesmus of the bladder and rectum; strangury; urging to urinate increased by standing or walking; incontinence; urine high-colored, contains albumin, shreds of membrane, or blood; gangrenous cystitis; abdomen distended and painful, with cutting pains, especially in the hypogastrium; vomiting and nausea; great thirst.

Colocynthis.—Although sometimes recommended for acute cystitis, we believe that it will be found more useful in a chronic condition, or during the stage of decline of an acute attack. See Chronic Cystitis.

Epigæa repens.—See Chronic Cystitis.

Equisetum hyemale.—Dysuria, especially in women; bladder feels tender and sore, not relieved by urinating; constant desire to urinate; extreme and frequent urging to void the urine; severe pain after micturition; feeling of distension; profuse urination; high-colored, scanty urine, containing mucus. This remedy enjoys a very high reputation among the country women for urinary difficulties, and we have had very satisfactory results from its exhibition.

Mercurius corr.—Hæmaturia; painful, difficult urination; filaments or flesh-like pieces of mucus in the urine; strangury.

Nux vomica.—Pain in the bladder; great urgency to urinate, with discharge of only a few drops of high-colored, bloody, burning urine; pressure on the bladder before urinating; vesical tenesmus; urine pale at first, later is scanty, reddish, and may contain viscid purulent mucus.

Terebinthina.—Tenderness of the hypogastrium; vesical tenesmus; severe burning in the bladder; strangury with bloody urine; cystitis after typhoid fever.

The following remedies may be consulted: Eupatorium purp., Mercurius vivus, Pulsatilla, Sepia, Sulphur, Tarentula.

In addition to such remedies as may be indicated, the following should be borne in mind as having proved many times beneficial, though thus far employed empirically. *Kali brom.* in xxv.-grain doses, or, even better, *Hydrobromic acid*, are highly recommended for frequent micturition and tenesmus. *Benzoic acid* or *Benzoate of ammonia* are particularly efficacious for strong ammoniacal or bad-smelling urine. *Eucalyptus globulus* we have found very useful, more especially in subacute cases; we employ the oil in doses of three or five drops. *Sulphocarbolate of soda* has a marked effect in preventing the decomposition of the urine, though the salt cannot be found in the urine. Flaxseed, slippery elm, or marshmallow tea; Clysmic, Vichy, or Poland water, should be freely taken.

Locally, hot sitz-baths, or the application of hot fomentations as poultices, or cloths wrung out of hot water, or of a decoction of Chamomile flowers, or hops, will add materially to the comfort of the patient.

The catheter should not be employed except under the most pressing necessity, and then a soft instrument should be selected, and passed with the utmost gentleness.

CHRONIC CYSTITIS.

Synonyms.—Chronic inflammation of the mucous membrane of the bladder, Catarrh of the bladder; Cystorrhœa, Cystitis mucosa.

Definition.—By the term "chronic cystitis" we understand a condition characterized by an excessive secretion of muco-purulent material by the mucous membrane of the bladder, and due to subacute or chronic inflammation of that structure, though the deeper layers of the organ may also be involved.

Of all the diseases to which the bladder is liable, chronic cystitis holds the first rank as to frequency. It is more common in men than in women, in those who have passed middle life than before that period, and is rarely seen before puberty, except in connection with stone.

Ætiology.—Chronic cystitis rarely, if ever, occurs as an idiopathic affection, and the surgeon will find, on close investigation, that it is always dependent, directly or indirectly, upon some coexisting malady. The disease may follow without intermission an acute attack of cystitis; but usually the inflammation is subacute or chronic from the commencement. In the great majority of cases the exciting cause is obstruction to the flow of urine, or inability on the part of the bladder to empty itself; hence, stricture of the urethra, prostatic hypertrophy, and calculus are, from the frequency of their occurrence, the most common causes of catarrh of the bladder.

In women the same effects are produced by compression of the urethra against the pubic symphysis, or change in the position of the urethra by displacements of the uterus, or upon conditions in the pelvic region pressing upon, or dragging down, the bladder. Or the affection may be produced by paralysis or atony of the bladder, induced by direct injury, over-distension, disease of the nervous centres, etc. In all these instances there is more or less residual urine, which, in time, will decompose and serve as a still further cause in the production of the catarrhal state.

Chronic cystitis sometimes exists in connection with, and is dependent upon, organic diseases of the kidneys, bladder, vagina, uterus, or rectum. The following are also cited as being productive of the condition in question: exposure to cold, excessive indulgence in ardent spirits, drastic purgatives, diuretics, cantharides, turpentine, venereal excesses, and repulsion of cutaneous eruptions. Catarrh of the bladder is very common in Egypt, and is due to the presence of a parasite, the Bilharzia hæmatobia.

In persons of a scrofulous, gouty, or rheumatic diathesis, the mucous membrane of the bladder, in common with other mucous surfaces, shows a decided predisposition to assume a chronic form of inflammatory action from slight causes, but we question very much whether these constitutional taints are capable of producing a catarrhal cystitis without some other exciting cause, as is claimed by some writers.

Pathology.—The morbid appearances observed after death vary. In mild cases, or in the early stage, they are generally confined to the neck and base of the organ; the membrane, usually pale, and tumid from infiltration into the sub-epithelial structures, is in a state of passive hyperæmia, presenting dots or streaks of blood, which may be in the dilated bloodvessels or extravasated, the color being blackish. In severer forms, or at a later stage, the changes extend, and may involve the entire internal surface of the viscus; the membrane is thickened, softened, flocculent, separates easily from the subjacent structures; hence abrasions, or ulcerations, especially in the neigborhood of extravasations, occur, leaving exposed the muscular layer. The surface is covered with a layer of muco-purulent secretion, and the urine is dark-colored, turbid, and ammoniacal. The disease being due, as we have stated, in the majority of instances to obstruction to the flow of urine, and the bladder rarely being completely emptied of its contents, frequent and vigorous contractions of the muscles of the bladder are induced. Increased activity results in increased development, and hence we find the muscular fibres greatly hypertrophied, and standing out in bold relief as cords or columns, and offering an appearance similar to that presented by the interior of the heart. This muscular hypertrophy may be co-centric or eccentric. If of the former variety, the capacity of the bladder will be encroached upon, and sometimes to such a degree that its capacity will not exceed an ounce or two; while in excentric hypertrophy, which is more commonly seen, there is usually associated a variable amount of dilatation of the organ, rendering it capable, in some cases, of holding several pints of fluid. The pressure of the urine upon the parietes of the bladder, during its powerful contractions, gradually causes a pushing out, or protrusion, of the tissues between the muscular fibres, as offering the least resistance, and thus " pouching " or " sacculation " occurs, more or less pronounced according to the degree of obstruction to the exit of the urine or the length of time it has existed. The prominent portions of the muscular columns are generally of a bluish-red or purplish color, while the pouches or sulci between them frequently contain calculous concretions.

Under the pressure of the accumulated urine the ureters and kidneys also suffer; the former become tortuous and dilated, and the lining membrane granular and rough, sometimes covered with flakes of lymph. The secreting portion of the latter becomes gradually absorbed and reduced to a thin layer over the dilated pelvis and infundibula.

Symptomatology.—In the early stage, or in the mild cases, there are generally no constitutional symptoms, and local signs are wanting, or confined to an increased frequency of micturition, with some burning in the course of the urethra, a feeling of weight in the perinæum, and, perhaps, pain or a sense of discomfort in the region of the bladder and adjoining parts. Thus the disease comes on insidiously and is frequently overlooked entirely, the attention being absorbed by the complaint to which the cystitis is due; hence, the affection may have made considerable headway before it is detected.

The urine at first presents nothing abnormal, but gradually it becomes turbid and deposits a sediment, light in color and readily mixable with the urine on agitation, or it may appear as strings, flakes, or lumps, which under the glass are found to consist of an excess of mucus, epithelia, and pus-corpuscles; chemically, an amount of albumin corresponding to the quantity of pus is found. As the disease advances, or if of a more severe form, with ulceration, constitutional symptoms manifest themselves, such as restlessness, thirst, irregularity of the bowels, loss of strength and flesh, a low febrile state comes on, and delirium and coma develop, terminating in death. These symptoms and termination are attributed by some to the absorption of carbonate of ammonia into the blood, but Rosenstein has shown, by experiment, that the injection of this substance into the veins of animals always excites symptoms indicative of uræmia rather than such as we have mentioned. He attributes the fatal termination to the presence of bacteria in the blood.

The local symptoms are more marked, the calls to empty the bladder are more frequent, and the urine is voided with difficulty and in small quantity, perhaps with spasm and tenesmus. The pain complained of between the acts of micturition is of a dull, heavy, aching character, and is referred to the hypogastrium which is tender on pressure. The changes in the urine are most marked. In addition to its turbidity, etc., as described, it acquires an ammoniacal or offensive odor, manifest either when it passes from the bladder or soon afterwards; it is alkaline in reaction and highly acrid. If permitted to stand for a while, a thick, ropy, gelatinous sediment falls to the bottom of the glass, which adheres with tenacity to the vessel, and falls in a mass, not unlike soft soap, when poured into another receiver, or it can be drawn out in strings. In the early stages the amount of mucus secreted is small, not over a few drachms a day; later, and in severe cases, it may constitute one-third, or even one-half, of the total discharge. Under the microscope this sediment is found to be composed of mucus and pus corpuscles; epithelia from the bladder; the ammonio-magnesian, or triple, phosphates; phosphate of lime, and bacteria. If ulceration has taken place, red blood-corpuscles will also be found. The conversion of urea into carbonate of ammonia has received several explanations. Until recently it was supposed that the mucus secreted by the inflamed membrane acts as a ferment, and that the alkali of the mucus serves to render the urine neutral or alkaline. The more recent theory is that the change in question is produced by the presence in the urine of a peculiar ferment or excitant of putrefaction, and that this consists either of organized bodies, as bacteria, or some non-organized material, such as a particle of putrid matter. However induced, the carbonate of ammonia irritates the mucous membrane, and induces a hypersecretion of mucus and pus, which, in turn, reacts on the urine and favors its decomposition and the production of the carbonate of ammonia. Thus the two conditions mutually aggravate each other and perpetuate each other's existence, even after the original cause has ceased to act; hence, a case of chronic cystitis left to itself invariably goes from bad to worse.

Pyelitis is a very frequent consequence of chronic cystitis, and will be again mentioned in connection with the diagnosis. Not unfrequently acute attacks of inflammation of the bladder will be lighted up in the course of a chronic cystitis by various causes, as errors in diet, exposure to cold, instrumentation, venereal excesses, etc. When such an acute exacerbation occurs, the urine becomes comparatively clear, and a return of the appearances characteristic of the chronic state indicates, and is coincident with, a subsidence of the acute attack. Impotency is sometimes associated with cystorrhœa.

Diagnosis.—Generally no difficulty attends the recognition of cystorrhœa, the symptoms as enumerated, with the changes observed in the urine, rendering a diagnosis easy. It is of great importance to determine whether the catarrhal condition is idiopathic or symptomatic of some other condition, as is almost invariably the case. This must be done by exclusion. The diseases with which it is most frequently associated are: stricture, prostatic hypertrophy, stone or foreign body in the bladder in men; while in women uterine or pelvic disorders or stone are the more frequent causes.

We have seen that pyelitis is a not uncommon result of chronic inflammation of the bladder; and when thus associated, it is not only difficult, but it may be impossible, to determine whether pyelitis exists, or not, unless there exists a tumor in the flank. The examination of the urine may throw but little light upon the subject, as it receives the stronger impress of the bladder, prostatic, or urethral disorder. While it is highly desirable to determine in a given case of cystorrhœa whether the kidneys are involved, or not, as affecting the prognosis, it is much more important to determine whether the vesical symptoms are due to a catarrhal condition of the bladder or to a pyelitis existing alone, as it not unfrequently happens that the bladder is vigorously treated for a supposed chronic inflammation when the real difficulty is located in the kidney.

In the early stages of pyelitis the character of the epithelia found in the urine may aid in locating the disease in the upper urinary passages, but later, if one is not very expert in the use of the microscope, little reliance is to be placed upon them, as transitional forms from the bladder are very likely to be mistaken for normal epithelia from the renal pelvis. In pyelitis the quantity of pus is usually greater than in cystorrhœa, and the urine is *acid* or feebly ammoniacal. The source of the pus may be sometimes determined by resorting to the expedient instituted by Sir Henry Thomson, "a soft catheter is gently introduced just within the bladder-neck, and the urine drawn off, and the viscus gently washed out with tepid water. If the water cannot be made to come away clean, the inference is that the pus comes from the bladder. If it will flow clear, then the catheter is corked for a few minutes, the patient keeping quiet, and the first drachm of urine which collects may be drawn off and examined. The bladder is now again washed out, and if, after a single washing, the second flow of injection be clear, while the drachm of urine contained pus, the inference is that the pus comes from other sources than the bladder."

In pyelitis the ureter may become blocked, and the urine will be clear for a variable time, and then, the obstacle having given way, pus in large quantities will suddenly appear again in the urine. Pain and tenderness in the loins can frequently be found in pyelitis, and the febrile movement and loss of strength will be out of proportion to the amount of vesical trouble. A history of antecedent nephritic colic will point to the kidney as the part diseased.

Prognosis.—The prognosis in chronic cystitis is very variable, depending upon the cause of the difficulty, the length of time it has existed, the stage it has reached, the age of the patient, and the inroads it has made upon the strength of the sufferer.

In a case of moderate severity, and when the cause can be removed, as a stricture, stone, or misplaced uterus, etc., a cure can be confidently looked for, unless great organic changes have taken place; or the disease can be held in abeyance, but subject to relapses from time to time from slight causes. When due to prostatic disease, and in those well advanced in life, while much may be done to relieve, and life prolonged for many years, a cure cannot be anticipated. If the ulcerative stage is reached and the ureters and kidneys are involved, the complaint usually proves fatal, the patient being gradually worn out by suffering, loss of sleep, and exhaustive discharges.

Treatment.—There is usually but little, if any, opportunity for preventive treatment in this affection, as the patients do not come under observation until the disease is established, though, it may be, in a mild degree. In entering upon the management of a case of chronic inflammation of the bladder, the first indication is to remove the exciting cause; if this cannot be accomplished, then every means must be employed to render it as inoffensive as possible. The diet should be chiefly farinaceous, simple and of an unirritating character during the more acute exacerbations of the disease. Complete rest should be enjoined. With a diminution in the severity of the attack, or in mild cases, or in those who are much debilitated, a more generous diet may be allowed, including animal broths, fresh meats, fish and oysters. All rich and highly spiced dishes and the usual condiments should be interdicted; as also spirits, wines, beers, tea and coffee.

The best drink is milk, and this article should enter largely into the bill of fare. Plain water, flaxseed or slippery-elm tea, Clysmic or Vichy water, may be taken *ad libitum*.

Exposure to cold should be carefully avoided, and flannel should be worn the year around, while a healthy state of the skin should be promoted by frequent bathing and friction.

The patient should be directed to void his urine, and after he has satisfied himself that he has emptied the bladder, a catheter should be gently introduced to determine whether there is any residual urine, and, if so, how much. If it is found that the bladder is not able to expel all its contents, the employment of the catheter once, twice, or three times in the twenty-four hours should be insisted upon, the frequency of its introduction depending upon the amount of residual urine and its character. In mild cases, with a moderate amount of residual urine, the simple complete emptying of the viscus by the catheter, as mentioned, is all that is required in this direction; but if the case is severe, or has existed for a long time, and the urine is highly charged with pus and mucus, and is ammoniacal, then the bladder should be washed out either with simple warm water or with water variously medicated. Two methods of procedure are employed to wash the bladder; the fountain-syringe provided with a two-way stop-cock may be employed. As soon as the patient begins to experience a sensation of vesical distension, the cock is turned, which prevents any further inflow, and at the same time permits the escape of the contents of the bladder; when the viscus is empty, the cock is again turned, and another supply of water is allowed to enter the bladder. This process is repeated until the water returns from the bladder clean. If it is desired to introduce a medicated injection, it should be prepared beforehand in a vessel placed near at hand, so that, as soon as the washing has been accomplished, the medicated solution can be poured into the bag and permitted to flow into the bladder. Instead of the fountain-syringe, a bulb-syringe may be used. Syringes worked with a piston are objectionable, as even with the utmost care the fluid is likely to be thrown in by jerks. The following rules should govern the use of injections, either simple or medicated, into the bladder: Warm water should be used at first; no more than two or three ounces of fluid should be introduced at a time; the fluid should be introduced gradually and without jerks. One injection should follow another until the water returns tolerably clear; medicated injections should not be introduced until the viscus has been washed clean, nor should they be allowed to remain, as a rule, longer than from one to three minutes.

The objects in view in employing injections into the bladder are: first, to wash out any urine that may be contained in pouches, which has failed to escape even when the catheter is used; secondly, to wash out any sediment that has accumulated in the organ, and to cleanse the walls of the viscus; thirdly, to modify the sensibility of the organ and restore its natural contractile power, which has been impaired by the inflammatory process; lastly, to excite a more healthy action in the parts affected.

Therapeutics.—**Ammonia mur.**—A favorite remedy of the late John F. Gray, M.D., for catarrhal cystitis, used empirically.

Benzoic acid. Benzoate of Ammonia.—Scanty dark-red urine; bloody-looking urine, ammoniacal odor; thick red sediment; acrid irritating urine; frequent desire to urinate, vesical catarrh; offensive urine, granular mucus, with phosphates in the urinary sediment.

Chimaphila.—Chronic cystitis; ulceration of the bladder; scanty urine, containing large quantities of muco-purulent material; urine thick, ropy, of brick color; bloody sediment; frequent and profuse urination; urging to urinate after the urine has been voided; bladder feels full.

Epigæa repens.—Catarrh of the bladder; dysuria; tenesmus vesicæ after micturition; burning in the vesical neck when urinating; bloody sediment; urine contains mucus and pus.

Eucalyptus.—Incontinence of urine; dysuria, catarrhal cystitis. One of the most useful remedies.

Hydrastis.—Chronic cystitis; urine has a decomposed odor; thick ropy mucus in the urine.

Pareira brava.—Urging to urinate; burning in the urethra; urine has a strong ammoniacal odor, and contains thick, viscid mucus.

Phytolacca.—Urging to urinate; dark-red urine; chalk-like sediment; pains in the bladder before and during urination; frequent and painful desire to micturate.

Populus.—Catarrh of the bladder, especially in elderly persons; painful urination; urine scanty; large quantities of mucus and pus in the urine; tenesmus vesicæ.

Uva ursi.—Vesical catarrh; painful micturition, with burning; urine slimy, purulent, ropy, and has a strong, pungent odor.

Consult also: Calcarea carb., Equisetum, Lithia carb., particularly indicated when the cystitis is associated with a gouty or rheumatic diathesis. Lycopodium, Sepia, Sulphur, Buchu, Copaiva and Cubebs are also valuable drugs, though employed empirically.

The following are the agents most commonly employed to inject into the bladder:

When there is considerable local irritability, but the amount of pus is not excessive, nor the urine very alkaline, we have found the following prescription very useful:

℞. Sodæ biborat.,	℥j.
Glycerini,	
Aquæ,	āā ℥ij.

Sig. A teaspoonful to a four-ounce injection.

Acetate of lead, one-sixth of a grain to the ounce of injection, to begin with; and gradually increased to one grain to the ounce of water. Dilute nitric acid, two or three drops to the ounce of water, may also be used under the same circumstances, although the latter, somewhat stronger, will be especially useful when the urine is strongly alkaline and tends to let fall the triple phosphates in the bladder, thus giving rise to danger of the formation of a calculus.

Nitro-hydrochloric acid may be substituted for nitric acid; used in the same proportion and under similar circumstances.

An infusion of Hydrastis, or one or two grains of the Muriate of hydrastin to the ounce of water, has in our hands rendered very excellent results.

In some cases, Sulphate of zinc, or Nitrate of silver, in the proportion of one-fourth of a grain to one grain to the ounce of water, has proved very beneficial, and in obstinate cases a solution of the latter, as strong as ten or fifteen grains to the ounce, may be employed.

Other substances, as Boracic acid, grains fifteen to twenty to the ounce; Chlorate of potash, grains five to ten to the ounce; Listerine and Carbolic acid, are worthy of trial, having produced good results in daily practice.

IRRITABILITY, SPASM, AND NEURALGIA OF THE BLADDER.

The three conditions forming the heading of this chapter are by some writers considered as distinct and independent affections, while others include under the terms spasm and neuralgia all such manifestations as the former writers classify as belonging to irritability. Again, a few authors reject entirely the terms irritability and spasm, and embrace under the single term neuralgia all of the neuroses of the bladder, excepting paralysis and atony. So much has been written on irritability of the bladder, and so commonly is it spoken of as if it constituted a diseased condition in itself, that it seems best to devote a few words to its consideration, although the writer considers it advisable to altogether dispense with the term when used to express anything more than an increased frequency in the performance of the act of micturition. This symptom is common to most genito-urinary affections, and it is in this restricted sense that we would employ it. True, there are now and then cases presenting themselves in which the only factor or, at least, the most prominent symptom, is abnormally frequent calls to empty the bladder; such cases are, in our opinion, examples of mild spasm of the bladder, and if the term irritability is employed at all in connection with them, it should be used to express simply the prominent symptom, having no reference whatever to the morbid condition which causes it. Hence, whatever may be said here in regard to spasm will embrace also all that belongs to irritability as described by those who consider the latter as a distinct affection.

As regards the remaining terms, spasm and neuralgia, we believe that there is not a little propriety in uniting under the single term neuralgia all such cases as are by some writers included under the two terms; but commonly the idea of pain, more or less pronounced, is almost invariably associated with the word neuralgia, and to employ the latter term to express a state in which pain does not play a part, only tends to confuse and mislead. We consider it advisable then to retain the terms spasm and neuralgia, though the two may be, and not unfrequently are, so intimately associated that it is impossible to draw a sharp line of distinction between them.

SPASM OF THE BLADDER.

Synonyms.—Cystospasm, Tenesmus vesicæ.

Definition.—Spasm of the bladder may be defined as being abnormal contractions of the muscular apparatus of that organ, excluding diabetes.

Ætiology.—Of the neuroses of the bladder, spasm is of the most frequent occurrence. It must not be considered as constituting a disease in itself, but rather as a symptom, a local expression of disease or abnormal condition existing in some part of the body, and it is the duty of the physician to so regard it, and search for the cause. Such causes, for the sake of convenience, may be divided into three classes: 1. Diseases of the genito-urinary organs. 2. Diseased conditions of neighboring organs. 3. Disorders of the general system.

The desire, more or less urgent, to empty the bladder, attended with a variable amount of pain, is a symptom common to almost all of the diseases of the genito-urinary organs. Thus, it is a prominent symptom of stricture of the urethra, morbid conditions of the prostate gland, stone or foreign body in the bladder, and organic disease of the kidneys or ureters.

But the most frequent cause is an inflammation of the tissues in the neighborhood of the sphincter vesicæ, and particularly of the mucous membrane. Cystitis in its various forms and consequences thus becomes a prominent cause in the production of spasm; but it is especially produced by a chronic urethritis in the prostatic region, such as frequently remains from a gonorrhœa, an ulceration of the orifice of the prostatic or ejaculatory ducts, or a simple erosion of the mucous membrane. In all of these cases the inflammation is superficial, and not sufficiently intense to attack the sphincter itself; but it is sufficient to irritate it and to put it in a state of erethism, so that the contact of the urine produces the desire to micturate too soon or leads to development of irregular and painful spasms. In the same manner the spasm is excited by the lodgment of a calculus in the urethral canal. In cases of stone in the bladder, the frequent or continuous contact of the calculus with the vesical neck may produce a degree of irritation that will continue long after the stone has been removed. We call to mind one case in which lithotrity was tried, and failed on account of the large size and hardness of the calculus; subsequently supra-pubic lithotomy was made, and the calculus and several fragments—the result of the previous operation—were extracted. The patient recovered, but always complained of the same pains and distress which he experienced prior to the operation. So severe and characteristic were these pains that we feared that we had failed to remove all of the fragments. The patient subsequently dying of an acute affection, an opportunity was afforded us to examine the bladder and to demonstrate that the viscus was entirely free from any foreign body.

Spasm of the bladder is frequently met with in children, and is commonly due to a redundant prepuce, phimosis or balanitis, adhesions, dentition, etc.

In some cases where no cause can be determined, the theory advanced by Billroth may be entertained, that the spasm may be due to "hyperæmia with superficial epithelial detachments, and sometimes slight erosions of the mucous membrane at the neck or base of the bladder, or in the ureters or pelvis of the kidney."

The habit of too frequently emptying the bladder, sexual excesses and masturbation may result in a permanent condition of mild spasm; the mucous membrane becomes hyperæsthetic, so that even a small amount of urine in the bladder will cause discomfort until voided. Morbid condition of the urine is a very common cause. Dr. Prout* has observed that all deviations from the normal state of the urine may prove a source of irritation in the bladder and kidney; such changes may occur at the time of, or after, excretion, and reference to them will again be made.

2. Spasm of the bladder may result from some condition or disease in neighboring parts. Thus, pressure exercised by an impregnated uterus; displacement and disease of the womb, inflammation of the pelvic structures, hæmorrhoids, ulceration of the rectum, fissure of

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* On Stomach and Renal Diseases, p. 366.

the anus, ascarides, fæcal accumulation in the rectum, chronic dysentery.

3. Disorders of the system in general are many times the cause of spasm of the bladder. So true is this statement that perhaps the first symptom which drives the patient to a physician is a frequent desire to urinate, with or without pain. True, he may have had other symptoms indicating that his health was not perfect, but he has thought but little of them, much less associated them with the bladder difficulty. Such conditions are prominently the rheumatic and gouty habit. The patient may not have pronounced rheumatic attacks, but is prone to complain of pains and aching in the back and limbs, perhaps some eruption on the skin, and generally decided derangement of the digestive organs, as evinced by flatulency, distress after eating, with acid eructations, etc. So too, in gouty persons, the disease may be manifested only by symptoms of imperfect digestion, with perhaps pains in, and swellings of, the small joints. Or, distinct paroxysms of gout may occur, at which times there may be great frequency of micturition, with burning and pain or discomfort about the bladder or urethra, with occasionally an increased secretion of mucus, which, with the burning and distress, may resemble an attack of gonorrhœa. Sometimes, the symptoms referable to the urinary tract will be present during the intervals of gouty paroxysms, and disappear during the actual attack.

Independent of the constitutional vices just considered, any disorder of the digestive organs that will result in imperfect oxidation or assimilation of food; any sudden chilling of the body, causing determination of blood from the surface to the internal organs, thus producing increased activity of the kidneys, may produce spasm of the bladder.

In this category belongs the frequent micturition incident to attacks of hysteria and during nervous excitement. In such cases the kidneys are exceedingly active, and excrete rapidly large quantities of watery urine, which not only irritates the bladder by producing rapid distension of the viscus, but also by being deficient in the normal proportion of saline matter.

In all these conditions the bladder difficulty is due to faulty urine; either it is too acid or too alkaline; too rich in salts, or too diluted, or it contains some unnatural ingredients, as pus from a neighboring abscess or from the kidney. Sometimes severe paroxysms of pain located at the neck of the bladder occur in patients laboring under cerebral or spinal disease, and frequent urination is a common symptom of sunstroke, or from long exposure to the rays of a tropical sun.

In the chapter on Atony of the Bladder the opinion was expressed that the inability to empty the bladder, occurring in connection with accidental or designed mutilation of the body, was due to spasm of the sphincter vesicæ rather than to a loss of tone or innervation of the bladder.

Pathology.—But little remains to be said of the pathology of this affection beyond what has been considered under its ætiology. The normal desire to urinate is due to an impression made upon the muscular coat of the bladder; hence, if that structure is in a state of hyperæsthesia, it will respond to impressions not only more readily, but more violently than in health; or disturbances in parts having their nerve-supply from the same source as the bladder, the lumbar and sacral plexuses, may, by sympathy, excite the bladder to untoward activity. When the condition has obtained for a long time, the increased activity induces an increased supply of blood, whereby two results are produced: a congested condition of the parts, and commonly concentric muscular hypertrophy, or from over-use the opposite condition, paralysis, may result. The organ contracting violently and squeezing parts already congested, soon converts the congested condition into one of inflammation of varying degree of intensity; hence the urine which was normal at first—or if abnormal, and thus the cause of the original trouble, was abnormal from the time it left the kidney—now contains an excess of mucus or pus, the product of the newly developed cystitis, which in turn tends to produce further change in the urine.

Symptomatology.—In the mildest form spasm of the bladder presents the unique symptom of frequent desire to empty the organ. If the affection is more pronounced, the element of pain or distress will be added, and its severity will vary greatly, from a slight discomfort to agonizing suffering. In consequence of the violent tenesmus which is sometimes very marked, there results irritation of the rectum, hæmorrhoids, prolapsus recti, and pruritus ani; or rupture of capillary vessels of the vesical neck, with emission of a few drops of blood at the termination of the act of micturition. The pain is usually experienced first at the neck of the bladder, and then extends down the canal to the glans penis; or from the vesical neck it may radiate to the rectum, hypogastrium, perinæum, testes, lumbo-sacral region, or down the thighs. At times, the distress is experienced the moment the urine escapes through the internal meatus, and then gradually diminishes until toward the close of the act, when it increases in severity and reaches its height with the expulsion of the last few drops. In mild cases the patient will have time enough to seek a proper place to relieve himself before the urine escapes, but frequently, once the desire is experienced, it is so pressing that the urine is expelled before he has time to reach a retreat or even to adjust the dress; or, just as the urine is about to flow, it is arrested by a sudden contraction of the sphincter, which is in part an involuntary spasm and partly a voluntary act on account of the pain. Again, the urine may issue in jets, perhaps twisted or forked; or the stream, at first feeble and started with hesitation, will increase until a normal volume is obtained, and then be suddenly arrested; and this may be repeated several times before the bladder is emptied. In cases presenting symptoms such as we have just enumerated, the spasm is located in the detrusor alone, or in both the detrusor and sphincter. Not unfrequently the sphincter only is affected, and if severely so and prolonged, complete retention is the result. The spasms are prone to be aggravated by damp, raw weather, and by any depressing or irritating influences acting on the nervous system. They vary greatly in their frequency; at times, every act of micturition is attended with more or less spasm, and more or less pain, while in other cases the attacks may occur only on certain days, the intervals being short or long.

Not unfrequently neuralgic pains in the bladder, penis, testicles, and spermatic cord are complained of during the intervals of micturition.

In young men a common accompaniment is frequent erections and seminal emissions. In severe and long-continued cases the general health may show marked evidences of depression. The appetite is impaired, the bowels confined, there is loss of flesh and strength, the mind becomes gloomy, and a hypochondriacal state is induced. If an attempt is made to introduce a sound into the bladder, as the instrument approaches the membranous urethra, the compressor urethræ muscle will spasmodically contract and bar its progress, and more or less pain will be experienced. By steady pressure of the beak of the sound against the obstruction, it will gradually cede, with perhaps a quivering sensation, and the instrument passes through into the prostatic urethra, provoking, as it does so, a feeling of nausea and faintness, and possibly an erection. When the neck of the bladder is reached, an uncontrollable desire to urinate is experienced, and, if this part of the organ is inflamed, violent tenesmus may be brought on, preventing the ingress of the instrument, or even forcing it back into the more external portions of the canal, and urine may be forced out by the side of the sound, while the pain is exquisite. Soon the paroxysm passes off, and the instrument glides into the bladder by a sort of suction-process.

Diagnosis.—In many cases little or no difficulty is experienced in arriving at a correct diagnosis. But not unfrequently the condition will be associated with other morbid states of the bladder and cause them to pursue an unusually protracted course, or so alter their manifestations as to throw doubt into their recognition. It should always be remembered that irritable bladder and spasm are but phases of the same condition, and are usually simply one, though perhaps the most pronounced, symptom of disturbance in other parts. Consequently the urine should be carefully examined chemically and microscopically, for by so doing, not only will the cause of the bladder-symptoms be found, but disease in other parts, not before suspected, may be discovered. The conditions most likely to be confounded with spasm are stone and cystitis.

Upon considering the symptoms presented in a case of well-marked spasm, one cannot but be struck by the similarity they bear to those presented in a case of vesical calculus. So strong is the resemblance that on more than one occasion cystotomy has been performed for the removal of the calculus, and no stone found. In such cases the diagnosis can only be made by repeated examinations with the searcher under favorable circumstances.

The absence of fever, of hypogastric tenderness, and, up to a certain stage, the failure to find bladder epithelia and pus will exclude cystitis; but when spasm has lighted up a cystitis, or when the urine contains pus from sources other than the bladder, the differentiation is very difficult, or even impossible, unless other evidences of the true sources of the pus are presented. A careful study of the forms of the epithelia present in the urine may clear up the diagnosis otherwise impossible.

Prognosis.—When the spasm is due to causes of a curable nature, prompt relief may be reasonably expected after the cause has been removed, provided the difficulty has not existed so long as to have resulted in organic changes in the bladder. Even when such changes have taken place, unless they are very great, a favorable issue can be quite confidently anticipated under appropriate treatment. The idiopathic form of the complaint, although very obstinate, usually yields to well-conducted treatment. In children, while the complaint may prove exceedingly rebellious, not unfrequently it will disappear spontaneously, as does incontinence toward the approach of puberty. Occasionally, in spite of the most patient and persistent treatment, the affection will continue year after year, and terminate only with the life of the sufferer.

Treatment.—In every case of spasm of the bladder a most careful examination should be instituted to establish its cause, for we repeat that in the majority of cases spasm is only a symptom. One has only to reflect upon the ætiology of this affection to be convinced that in spasm we have to deal with a condition which requires a profound knowledge of the physiology and pathology of the urinary apparatus.

The cause having been determined, our chief efforts should be directed towards its removal, which, if successful, usually terminates the treatment, though sometimes the bladder has undergone organic changes, or has received impressions which may remain long after the cause has ceased to exist. Under such circumstances, or when the cause cannot be removed or discovered, the treatment must be directed against the spasm itself.

In all cases in which the cause is doubtful, careful inquiry should be made into the sexual relations of the individual; for many times it will be found that the local symptoms are only one expression of a nervous state induced by improper or ungratified sexual excitement.

Therapeutics.—**Belladonna.**—Spasm of the bladder; paralysis of the sphincter vesicæ; continuous dropping of urine; vesical region very sensitive; sensation of burning and twisting in the bladder; retention of urine; great urgency to empty the bladder; involuntary discharge of urine; difficult micturition.

Cantharides.—Irritability of the vesical neck; difficulty in passing water; interrupted stream; violent urging to urinate, with tenesmus; heaviness in the bladder; cutting, burning, stitching pains in the neck of the bladder; paralysis of the sphincter vesicæ; burning and violent pain in the bladder; retention of urine; frequent micturition with scanty or profuse discharge of urine.

Conium.—Spasm of the bladder; flow of urine suddenly stops and continues after a short interruption; frequent urgent calls to empty the bladder; inability to void the urine; enuresis; pressure in the bladder.

Gelsemium.—Involuntary emission of the urine, alternating with dysuria; spasm of the bladder; tenesmus, preceded by great urgency.

Hyoscyamus.—Spasm of the bladder; retention of urine; paralysis of the bladder; difficult micturition; involuntary emission of urine.

Nux vomica.—Dysuria; spasmodic strangury; painful, fruitless efforts to urinate; frequent and urgent desire to empty the bladder; burning and lacerating pains in the vesical neck.

Pulsatilla.—Enuresis; spasmodic pain in the neck of the bladder during or after micturition, extending to the pelvis and thighs; continued pressure of the bladder without desire to urinate; frequent, almost ineffectual, urging to urinate, with cutting pain.

Rhus tox.—Incontinence of urine; as soon as the desire is experienced nature requires immediate relief; tenesmus vesicæ; urine voided slowly; frequent urging day and night; urine passes in a divided stream.

Sarsaparilla.—Frequent urination; tenesmus; ineffectual urging; urine irritating; urine passes in a thin feeble stream or in drops; scanty urine; pain at the end of micturition; painful contraction in the bladder without tenesmus; tenderness and distension of the region of the bladder; iridescent pellicle in the urine, after micturition; chills, commencing at the neck of the bladder and spreading in an upward direction.

Consult also Berberis vulg., Cicuta, Cannabis ind., Equisetum, Phosphoric acid.

In addition to the exhibition of internal remedies, we may derive great benefit from local treatment.

Thus, if the urine is alkaline from carbonate of ammonia, or contains much pus or mucus, the employment of medicated injections, as recommended for the treatment of cystitis, will yield very satisfactory results.

In many cases the introduction of an instrument through the vesical neck is attended with great success. In commencing this mode of treatment we employ a soft bougie of medium size, say a No. 16 F. This should be carried fairly into the bladder and immediately removed. At the next sitting a size larger should be introduced, and so on until a No. 18 or 20 F. is attained. A solid steel sound should now be substituted for the soft instrument, commencing with the same size as was last employed, and it should be permitted to remain *in situ* for a few minutes before it is withdrawn. The instrument should always be introduced with the utmost gentleness, and if an obstruction is met with, a little gentle *continuous* pressure against it will soon cause it to relax, and the bougie will glide into the bladder. The employment of instruments may be attended with much pain, and the symptoms may be aggravated for a time; but usually a sense of relief is experienced after a few hours, such as the patient has not felt for months. As long as the patient continues to improve after such local treatment, the sound should not be again used; but as soon as he feels that he is lapsing into his former state, the instrument must be again employed. This period of improvement varies greatly, from twelve, twenty-four, forty-eight hours, or even several days.

Gradually the intervals of instrumentation will become longer and longer until after a variable length of time a cure is complete. Even in cases which seem to be aggravated at first by this mode of treatment, it is advisable to continue it for a few times with the expectation that the parts will soon accommodate themselves to the irritation and be benefited by it. It is only after a thorough trial that it should be abandoned. To give it a fair trial, ether may be required, or the sensitiveness of the parts diminished by the employment of a sedative and astringent injection, such as one or two grains of Nitrate of silver and four grains of the Extract of opium to the ounce of water. A small quantity of this solution should be introduced into the membranous or prostatic urethra by means of a proper syringe, care being exercised that it does not pass into the vesical neck.

We have witnessed decided benefit from the employment of counter-irritation to the perinæum. Hot hip-baths or hot fomentations to the hypogastrium are very useful during acute attacks.

In extreme cases perfect rest for the bladder should be procured. This can be accomplished in women by inducing temporary paralysis of the sphincter by means of over-distension effected by passing the finger or a suitable instrument into the bladder. Care must be exercised, however, for if the dilatation is carried too far permanent incontinence may ensue. The same object can be accomplished in the male (or female) by introducing a catheter, under ether, if necessary, into the bladder, and retaining it in position for twenty-four or forty-eight hours. At the end of this time it should be removed, and after the patient has obtained some rest it should be again inserted and retained a longer time than at first, if possible. By this procedure the muscular apparatus of the bladder is put wholly at rest, and the contact of the instrument with the parts blunts the sensibility of the hyperæsthetic nerves; while at the same time the canal is opened out and absorption of inflammatory exudents is promoted. Should a cystitis of the neck be provoked, this treatment must be discontinued. As an extreme measure, cystotomy may be performed, the opening being made through the vagina in women, and in men either in the perinæum or above the pubes. By means of such an opening the urine will escape from the bladder as rapidly as it descends from the ureters, and absolute rest for the organ is secured.

Abnormal conditions of the urine should be corrected as much as possible by a carefully regulated diet; coffee, tea, beer, alcoholics, and rich, highly spiced dishes, or food difficult of digestion, should be interdicted, also tobacco, while proper exercise and bathing should be encouraged.

Much benefit will be derived from the free use of such waters as Clysmic, Vichy, Buffalo, Lithia, or Poland.

PARALYSIS, ATONY, PARESIS OF THE BLADDER.

Definition.—Paralysis: a complete loss of contractile power of the muscles of the bladder. Atony, paresis: synonymous terms for incomplete or partial loss of muscular activity.

The definitions, as above given, although indisputably correct, require, nevertheless, a word of explanation, since a clear and distinct understanding of the terms which are used to express the conditions under consideration is of the utmost importance to avoid confusion. Nothing is more common than to hear the term paralysis employed to express every degree and kind of inability of the bladder to contract upon its contents. Such employment of the term is incorrect. Authors are by no means agreed as to the use of the term paralysis. Some, as Sir Henry Thompson, restrict its use to a total loss of muscular power, which is invariably due to some change in the cerebral or spinal centres. Others employ the word to define a complete suspension of the action of the detrusor or sphincter, but recognize eccentric as well as centric causes for such suspension.

It is the latter condition which we propose to designate by the term, believing that it not only results from centric (cerebral or spinal) lesions, but also from causes acting on the bladder directly, as well as by reflex irritation operating through the spine.

The terms "atony" and "paresis" are very frequently employed to express a partial loss of contractile power, a slow, feeble, imperfect action of the muscular apparatus of the organ, in short, a loss of tone. But it is to be remembered that, in its highest expression, it so closely resembles paralysis that a sharp distinction cannot be drawn between them.

Ætiology.—*Paralysis* of the bladder is generally associated with paraplegia, and is due to lesions of the brain or, particularly, those of the spinal cord.

These lesions may be inflammatory in their nature, or due to apoplexy, traumatism, pressure of a tumor, or Pott's disease.

The paralysis may be complete or partial, temporary or permanent.

It may affect the detrusor alone, causing retention, or, the sphincter only, producing incontinence. If complete, there is also always present paralysis of the abdominal muscles. If the spine is affected, it matters not what portion of it, the results, so far as the bladder is concerned, are the same. It has been observed, however, that priapism is not uncommon when the lesion is above the tenth dorsal vertebra. Usually, when associated with paraplegia, there will be loss of sensibility as well as of motion; consequently, the patient suffers no pain or inconvenience, and so will fail to make known his condition, and, unless the attendant is upon his guard, the bladder will become greatly distended, giving rise to, possibly, considerable further mischief.

As a cause of paralysis, most authors include injury done to parts more or less distant from the bladder. Thus, paralysis of the organ is prone to occur after operations for hæmorrhoids, amputations, or other severe operations; also in connection with compound fractures and dislocations, wounds of the abdomen and bowels, etc. We doubt the propriety of including these conditions as causes of paralysis, for we believe that the inability on the part of the bladder to expel its contents under such circumstances is due to spasm of the sphincter and compressor urethræ, rather than to paralysis of the detrusor. Nevertheless, in order to avoid confusion, they will be included among the ætiological factors.

Again, paralysis may be the result of functional exhaustion of the nervous system; but inasmuch as its mode of production is practically the same which will be considered under the subject of atony, the reader is referred to that topic.

Lastly, transient, rarely permanent, paralysis of the bladder may follow the employment of Opium, Belladonna, and Hyoscyamus. It is from the local, rather than from the general, exhibition of these drugs that such results may occur.

Atony or *paresis* of the bladder.—As one of the infirmities of advancing years there may develop a condition to which the term *senile atony* has been given. The condition is a physiological one, and the changes which take place are not morbific.

The most frequent cause of atony is found in a condition that offers an impediment to the escape of the urine from the bladder, producing retention and over-distension. Such retention may be voluntary, as when an individual is so situated that he cannot comply with the demand to relieve his bladder, or fails to do so from feelings of delicacy. Under such a condition a constantly increasing amount of urine accumulates and the bladder becomes greatly distended until, at last, when an opportunity is afforded to relieve the viscus, the effort made proves ineffectual. Or, the retention may be involuntary and due to some mechanical obstruction, as hypertrophied prostate, or stricture of the urethra, sudden displacement of the uterus, tumors, and other pathological conditions of the pelvic structures, acting by pressure on the urethra.

Pressure of the fœtal head during labor may cause retention and over-distension; in addition to which mechanical obstruction there is also loss of innervation of the bladder from pressure of the child's head on the extra-vesical nerves.

The retention which so frequently follows protracted and difficult labors may be neglected until great distension has taken place, and when relief is finally offered the organ is found to have lost its contractility.

In functional nervous exhaustion, as occurs in typhoid or other low fevers, during the insensibility incident to compression and concussion of the brain, uræmia, etc., in short, in any of the conditions in which there is a loss or diminution of general or local sensibility to such a degree that the patient fails to appreciate the calls evoked by the distended organ, and so fails to relieve himself or make known his state to his attendant, irreparable mischief may result and, perhaps, a fatal issue determined, unless the patient is in charge of an intelligent and wide-awake nurse. Occasionally, atony may result from excessive venery or onanism; when occurring from this cause there is also in our experience a marked diminution or total loss of sexual appetite and power.

Pathology.—The changes which take place in the bladder closely resemble those found in cystitis. The mucous membrane is more or less intensely congested or inflamed, softened, perhaps ulcerated, and is covered with phosphatic incrustations. The parietes are thin, flabby, stretched, or may be hypertrophied; they may be softened, even to such a degree that rupture may occur, or adhesions may form, so that the bladder becomes fastened to the abdominal wall or neighboring viscera, under which circumstances even the catheter may fail to completely empty the viscus.

These changes are chiefly due to the decomposition taking place in the urine. The urea is rapidly converted into carbonate of ammonia, rendering the urine highly alkaline, ammoniacal, turbid, and surcharged with thick, ropy mucus. Such a urine, within an organ unable to expel its irritating contents, and further weakened by innervation, soon produces the conditions mentioned.

It is in paralysis due to lesion of the spinal cord that the changes in the bladder are seen in their greatest intensity and with greatest promptness, because the alterations in the urine develop so quickly. In atony, particularly when due to enlarged prostate or stricture or tumor, the residual urine may be slow in decomposing, and the mucous membrane may withstand the irritating carbonate of ammonia for a long time; sooner or later, however, cystitis will be lighted up unless proper treatment be instituted early and maintained perseveringly.

These remarks refer to cases in which the detrusor is only, or chiefly, involved; this is usually the case at first, the sphincter suffering later. If the sphincter alone is affected, incontinence is the result, and hence the train of pathological changes just described may fail to occur, or exist in a minor degree only, because the chief factor, retained and decomposed urine, is wanting.

Paresis from over-distension is due to two factors: first, the muscular fibres are stretched to such a degree that they lose their contractile power. Secondly, the nerves contained in the walls of the bladder are so strained as to interfere with their reflex activity, and they are incapable of transmitting motor force to the muscles. In the senile form of paresis the changes are not morbific, but simply the local expression of general decay of the body. They consist in a fatty degeneration of the muscular apparatus of the bladder, associated with dilatation of the venous plexuses and a superabundant deposit of fat about the viscus.

Symptomatology.—When the affection is far advanced there is usually no difficulty in recognizing it. The contractile power of the bladder being gone, the urine accumulates and distends the organ until a distinct ovoidal tumor, dull on percussion and fluctuating, is observed rising above the pubes. No relief being afforded, and the distension increasing, a time finally arrives when the sphincter is overcome sufficiently to permit a little urine to escape *guttatim*. Too much stress cannot be laid upon this symptom. It is a rule to which there are but few exceptions, that involuntary flow or dribbling of urine in the adult male means retention, or, as the French express it, engorgement with overflow.

When, however, the atony is due to causes acting gradually, as from senility, enlarged prostate, stricture, etc., the patient complains of no symptoms save perhaps increased frequency of micturition, with a certain amount of hesitation in starting the stream, which, when it comes, is feeble and small; this is particularly the case toward the close of the act, at which time the urine may simply dribble away, with the probability that some is likely to remain in the canal until after the dress has been adjusted, when it will escape, soiling the clothes and causing a great deal of inconvenience. If the condition has existed some time, the urine has a more or less strong ammoniacal odor.

If the paralysis is confined to the sphincter and compressor urethræ, or when, in addition, the detrusor is involved, the condition of true incontinence is present; hence no abdominal tumor can be found.

Diagnosis.—Usually no difficulty is experienced in recognizing these conditions if the physician is only cognizant of the causes and symptoms, and never loses sight of the fact that dribbling of urine signifies retention. The employment of the catheter completes the diagnosis; if the bladder is distended, the urine will flow through the instrument in a feeble stream, which may be increased in size and force by pressure from the hand on the hypogastrium or by the patient coughing or straining. Should no urine flow through a perfectly *pervious* catheter when *in situ*, aided by pressure on the bladder, there existing at the same time incontinence, we must make a diagnosis of paralysis of the sphincter and compressor urethræ. In all cases where frequent micturition, feeble stream, and foul-smelling urine are complained of, particularly by men advanced in life, the catheter should be used to ascertain whether there is, or is not, residual urine. In no other way can this point be determined, and its importance is so great that the physician's neglect of this means of diagnosis constitutes an act of almost criminal carelessness or ignorance.

A word of caution in regard to the employment of the catheter is not, however, out of place. It is always advisable to examine the urine, both chemically and microscopically, before introducing an instrument into the bladder, to determine the existence, or not, of organic kidney disease; we should always bear in mind the possibility of exciting an attack of urethral fever, which might prove a serious matter in the presence of organic renal degeneration.

The fear of inducing such an attack, even though mild, suggests that in elderly men the first instrumentation be made at their homes, keeping the patient quiet and warm for some hours after the introduction of the instrument.

Prognosis.—It is only after a careful consideration of the causes of paralysis and atony that a correct prognosis can be given; for largely in proportion as the cause is removable, or not, is the prognosis favorable or otherwise. If the affection is due to irremediable brain or spinal lesion, little or no improvement can be anticipated in the bladder complication.

If an enlarged prostate is the cause, the prognosis will largely depend upon the character of such enlargement and upon the sensibility of the urethra. For if a catheter can be readily introduced into the viscus, and without provoking undue irritation, the results of the obstruction can be overcome and rendered inoffensive.

So in stricture; its removal by surgical means at once affords an opportunity for remedies to act, both upon the overstretched muscles and nerves, and upon the cystitis. Thus the prognosis depends greatly upon the success or failure to remove or overcome the cause.

In atony, the result of overdistension, the age of the patient and the length of time the distension has continued must always be taken into consideration. The younger the patient, and the shorter the time the engorgement has existed, the more favorable will be the prognosis, not only as regards the ultimate result, but also as to the time when a cure may be looked for.

In slight cases a few hours or days are all that is required to enable the organ to regain its tone. In those cases where the bladder-walls have been more severely taxed, perhaps weeks or months will elapse before recovery takes place. Occasionally, even when the strain has not been excessive or greatly prolonged, the bladder never regains its power of contracting. As to the prognosis of the cystitis occurring in connection with the paralysis or atony, the reader is referred to the chapter on that subject.

Treatment.—On reviewing the ætiology of the affections under consideration we learn that little or nothing can be done in the way of prophylaxis against the paralysis itself, if due to central cerebral or spinal lesions; yet a great deal can be done to modify the resulting cystitis, and to this end our efforts should be directed. On the other hand, a thorough knowledge of the causes of atony will keep the practitioner always on his guard, and ever watchful, lest the bladder become overdistended, and he will be prepared to afford relief by means of remedies or the use of the catheter before serious mischief is done.

Two indications require to be met in paralysis and atony of the bladder: first, to relieve the distended viscus so that no further injury can result; secondly, to employ all means to restore to the muscular fibres their contractile power.

If the paralysis is due to central lesion which cannot be removed, we must content ourselves with thoroughly emptying the bladder every six or eight hours by means of the catheter. Under certain circumstances it may be well to tie in a catheter; but such a course is not to be adopted unless unavoidable. In introducing the instrument the utmost gentleness must be observed, for the sensibility of the parts being lost or impaired, we have not the sensations of our patient to aid us, and great injury may be inflicted by hasty or rough manipulations.

When possible, we prefer to employ the soft rubber "velvet eyed" catheter, but not unfrequently this instrument cannot be passed, and we then, especially in old men, resort to a catheter *à boule*, or a Mercier catheter. The English gum-instruments are also very serviceable; occasionally a silver instrument answers best.

In atony the employment of the catheter is no less important, even though the organ is not overdistended. The residual urine must be sought after and withdrawn at stated intervals, say once or twice in the twenty-four hours. This should be done not only to prevent the urine from decomposing, and forestall danger from cystitis, which must follow, but also to relieve the distended organ, which, though perhaps not overdistended, cannot contract within normal limits, and so fails to secure that exercise which all muscular tissue requires to maintain a healthy state. For the same reason the patient should be encouraged to make all possible effort to expel the contents of the bladder when the catheter is employed, and also during the intervals between its introductions.

The second indication is to be met by the exhibition of such remedies as have a specific action upon the cause of the paralysis or atony and upon the bladder itself, the choice between drugs having a similar local action being governed by the concomitant symptoms.

Therapeutics.—**Agaricus.**—Weakness of the sphincter vesicæ, dribbling of urine; can hardly retain the urine; urine flows and stops, dribbles away; has to strain to increase the flow; frequent desire to urinate; urination with coldness down the legs, numbness and twitches.

Arnica.—Paralyzed bladder: constant dribbling of urine; especially indicated after traumatism or overdistension.

Belladonna.—Paralysis of the bladder produced by overdoses. Region over the bladder very sensitive to pressure or jar; retention of urine, or difficult micturition; paralysis of sphincter vesicæ; dysuria; dark, hot, scanty urine.

Cantharides.—Atony of the bladder from overdistension; paralysis of bladder with frequent desire, but inability, to urinate; dribbling of urine; incontinence; retention; bloody urine.

Gelsemium.—Paralysis of the bladder in old people; paralysis of the sphincter vesicæ; spasm of the bladder; dysuria, alternating with enuresis.

Hepar sulph.—Weakness of the detrusor vesicæ; slow urination with only partial evacuation; delayed urination from atony.

Hyoscyamus.—Overdoses of Hyoscyamus produce paralysis of the bladder. Involuntary urination, scanty, retained urine; inflammation of the bladder with paralysis; micturition difficult from spasmodic or inflammatory condition of the neck of the bladder.

Nux vomica.—Paralysis of the neck of the bladder, paralysis of the bladder, dribbling of urine; constant urging to urinate.

Opium.—In overdoses, opium occasions paralysis, retention of urine; difficult, slow micturition.

Secale cornut.—Paralysis of the bladder; retention with unsuccessful urging; paralysis of the sphincter, of the whole bladder; incontinence of urine; retention.

Consider: *Atropine*, *Causticum*, *Cicuta*, *Laurocerasus*, *Plumbum*, *Sepia*.

Auxiliary Treatment.—In addition to the employment of remedies in a general way, a great deal can be accomplished by local treatment.

The injection of cold water into the bladder is of undoubted service. It should not be used until after the urine has been drawn systematically for a few days, in order that the parts may have become accustomed to the presence of instruments, and irritation, which often results from the use of the catheter, may have had an opportunity to subside. Three or four ounces of water are all that need be injected at once, and when this has passed out, a similar quantity should be introduced a second or a third time at each sitting. A larger quantity can do no good, and may do harm. The water should be tepid at first, and its temperature gradually reduced to 60° or even 50° Fahr., provided it does not produce discomfort.

The alternate injection of hot and cold water is more stimulating than either alone, and this method is preferable.

The water may be medicated, to render it more stimulating, by the addition of Arnica tincture, one drachm to the pint of water, or stronger. Strychnia in the strength of six grains to the pint of water, a little alcohol being added, may be used. Of this solution four ounces may be injected, three or four times a day, if necessary.

Medicated injections are more frequently called for to relieve the cystitis than to restore muscular power to the bladder.

The cold douche is highly beneficial, the cold water falling from a height alternately upon the lower portion of the spine and hypogastrium, followed by vigorous friction with a coarse towel or hair glove.

Counter-irritation to the lower portion of the spine may render some aid. We employ the Baumscheidt method for this purpose.

Electricity may also be employed with advantage. The induced current is more valuable here than the galvanic. One pole should be introduced into the bladder and brought in contact with the parietes of the bladder, the other being placed over the lumbar or hypogastric region; the current should be used cautiously and not for too long a time, gradually increasing both the strength of the current and the length of the sitting.

INCONTINENCE OF URINE.

Synonym.—Enuresis.

Definition.—The term enuresis is employed to designate that condition in which the bladder is unable to retain the urine.

We have seen that in paralysis and atony of the bladder the urine may escape involuntarily; the relaxation of the sphincter in such cases being nature's imperfect mode of relief. Under such circumstances the incontinence is usually indicative of the fact that the bladder is too full, and the term overdistension, or engorgement with overflow, should be employed to indicate that fact, and not the terms enuresis or incontinence of urine.

Ætiology.—True incontinence of urine is chiefly found in children before they reach the age of puberty; it is of frequent occurrence in women, but comparatively rare in men.

When met with in adults, it may have a variety of causes; in men one of the most frequent factors is paralysis of the sphincter of the bladder, and of the compressor urethræ muscle, due to cerebral or spinal lesion.

Occasionally an enlargement of the median lobe of the prostate may separate the lateral lobes and thus open the meatus internus to an extent that the urine escapes involuntarily. Or, rarely, senile atrophy of the same body, associated with atrophy of the sphincter, may lead to the same result.

External injury may result in enuresis, as: after the division of the vesical neck in lithotomy, from falls or blows on the perinæum, injury to the urethra, during prolonged or instrumental labor, or as a result of repeated child-bearing, overdistension of the sphincter by the introduction of too large bougies, or, in women, by the insertion of the finger into the bladder for the relief of the cystitis.

Inflammation, and its effects, of the bladder or urethra may result in incontinence. So also when there has been loss of substance at the vesical neck through ulceration, syphilitic or tubercular.

Mr. Langston Parker reports cases of incurable incontinence, the result of taking large doses of Copaiba.

Again, enuresis may be caused by hyperæsthesia of the bladder, as a whole or of its neck, and the prostatic urethra, due to an acrid condition of the urine, or by sympathy with irritation or disease in the kidneys, rectum, vagina, uterus, or at the glans penis.

The last we consider a very frequent cause not only of enuresis but of many other nervous phenomena. In cases of redundant prepuce, especially with a contracted preputial orifice, the glans is kept in a tender, moist condition; the smegma is retained, and prone to decompose and light up a balanitis, or balano-posthitis, which will generally subside without attracting attention, but is liable to leave the parts tender, irritable, or adherent, and the irritation is propagated to the bladder. Even in cases in which the prepuce can be readily retracted, and no evidences of irritation from filth, inflammation, or adhesions can be found, we have seen the enuresis, associated with the usual symptoms of stone in the bladder which had existed for thirteen years from infancy and had resisted every mode of treatment, radically cured from the hour the operation of circumcision was made.

We lay particular stress upon this subject, for we have operated scores of times and with marked success in curing not only the enuresis, but other nervous manifestations that have also been present in the cases.

We consider it, therefore, the duty of the physician to always examine the penis in cases of enuresis; and even though the local condition may seem to negative the supposition that the cause may be located there, still, the mere fact that the prepuce is redundant, in the absence of other tangible cause, is enough to warrant him in attributing the difficulty to the condition of the prepuce.*

Lastly, excessive sexual indulgence or onanism is sometimes at the root of the trouble.

Pathology.—After the consideration of the causes of enuresis as it occurs in adults, nothing more need be said regarding its pathology than the fact that occasionally there may be found some evidences of inflammatory action or thickening with increased sensibility of the vesical neck.

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* L. Voillemier and A. Le Dentu consider this a cause of irritable bladder, and not of true incontinence.

We have stated that the great majority of cases of enuresis are met among children; and though some of the causes we have enumerated may obtain with them, still, frequently the pathology of the affection is very obscure.

Often we meet with the condition under consideration in children who are subject to some other nervous manifestation, or who are of a decidedly nervous organization, either inherited or acquired. In such cases, we believe, hyperæsthesia of the vesical neck enters largely into the pathology of the enuresis. It may be associated with a weakness of the system at large, or of the sphincter alone, but still it remains the prime factor in the case.

As a result, as soon as a small amount of urine accumulates in the bladder, its contact with the irritable, sensitive neck gives rise to the desire to urinate too soon, and provokes the reflex action that expels the urine before the patient can prevent it by an act of volition. Some authors refuse to recognize hyperæsthesia as an explanation of enuresis, believing that such cases are due to spasm of the bladder, and should be so classified, though they admit that it is a very difficult matter to draw a line between some cases of enuresis and of spasm.

Another view, and one very generally entertained, is that the inability to retain the urine is due to general debility, with weakness of the sphincter in particular, though the latter may be weak without a corresponding feebleness of the system at large. With this weakness is frequently associated a diminution of the sensibility of the neck of the bladder and also, perhaps, of the deep portion of the urethral canal. As a result, the normal desire to urinate loses its intensity, and while marked enough to call the detrusor into sufficient action to overcome the weakened sphincter, and so cause the urine to escape, it is not active enough to waken the patient from sleep, or even to excite consciousness of what is taking place when he is awake; or, if he is aware of the call, the act is performed before he can prevent it.

This view is founded on the fact that a large proportion of the cases of enuresis occur in children of a more or less markedly scrofulous or rachitic constitution, particularly if they are badly nourished. Such children are not, of necessity, sickly, delicate, or puny, but they are far from robust, fall short of perfect health, and are prone to suffer from irritation or congestion of the mucous membranes in general, frequently, also, presenting evidences of nervous irritation.

It is owing to the frequent association of scrofulosis and enuresis that Mr. Coulson advances the idea that the latter may have as its cause the same condition which Billroth advocates as productive of irritability of the bladder, viz.: "superficial detachments of epithelia, and sometimes excoriations at the neck of the bladder."

Lastly, bad habits and dreams may give rise to enuresis.

Symptomatology.—The symptoms presented in cases of enuresis vary greatly. In its worst form the bladder ceases to perform its function as a receptacle for the urine, and to all intents and purposes it becomes a part of a continuous tube from the kidney to the external meatus. Hence the urine is discharged from the urethra as fast as it descends from the kidneys.

This condition obtains usually when the cause is mechanical or pathological in its nature, and especially in adults.

Generally the bladder continues to act as a reservoir, and the urine is voided in a natural manner, but without the volition of the patient.

When there exists only a weakness of the sphincter, as is frequently the case in women, the patient is able to retain the urine as long as she remains perfectly quiet, or sometimes during continued motion; but upon a sudden movement, as rising from a chair, coughing, sneezing, laughing, etc., a variable quantity of water will escape.

Not only is true incontinence of urine most commonly met with in children, but it generally presents itself in the nocturnal form. No difficulty is experienced during the day, but once the child is sound asleep, and some urine has accumulated in the bladder, it is expelled without arousing the patient. This may be repeated two or more times during the night, but is more apt to occur during the early morning hours.

In a more aggravated form the involuntary escape of water takes place during the day as well as at night, only the patient is aware of his necessities and will hasten to a convenient place to relieve himself; but before he can reach it, or arrange his dress, the sphincter is overcome and the urine escapes. In these cases the desire is experienced too late, or, sometimes, is not felt at all.

These conditions may be continuous or present themselves only under certain circumstances, as from over-fatigue, excitement, or sleeping in a strange place, etc.

Diagnosis.—The recognition of incontinence of urine offers usually no difficulties. It is to be differentiated from retention of urine with overflow, irritable bladder, and spasm. The present symptoms, the history, the age of the patient, and a physical examination, including the employment of the catheter, will not only establish the diagnosis but also the cause.

Diurnal incontinence or simply frequent urgent desire to empty the bladder is always to be regarded with suspicion, as indicative of irritable bladder and not of true incontinence. The distinction cannot always be made, but should be attempted.

Prognosis.—The prognosis of necessity varies greatly. If the cause can be removed before decided change of structure has taken place, the cure is radical and brilliant. Under other circumstances little or no benefit can be anticipated from treatment, except as preventing complications.

In children the prognosis is good. The difficulty may last for a few months only or continue until puberty, at which time it generally ceases spontaneously. In rare cases the trouble ceases only with life. Some cases are characterized by remissions, but no relief is derived from such temporary suspension of the difficulty. Again, a favorable issue may be ushered in by remissions, the disease having been continuous. Intercurrent disease, as eruptive fevers, may cut short an incontinence of long standing. Marriage has sometimes effected a cure in girls.

Treatment.—When the malady is due to deep-seated or incurable disease, no benefit can be anticipated from any mode of treatment. Under such circumstances all we can do is to provide the patient with some form of urinal.

Irritation in neighboring structures should be removed, including circumcision in cases associated with redundant prepuce or phimosis.

We have seen that an atonic condition is frequently the cause of enuresis. Consequently, every thing calculated to depress the vital forces should be avoided, and, on the other hand, all those means which tend to invigorate and build up the system should be brought into requisition.

The diet should be plain, nutritious, and easy of digestion; the amount of fluid taken should be carefully regulated, not too scanty a supply, lest the urine become too concentrated, nor yet too free an indulgence, else the bladder becomes rapidly filled with water of a low specific gravity, which is more irritating than urine containing a normal proportion of saline matter. If abstinence from liquids be enjoined it should have reference to the latter part of the day.

The child should be roused several times during the night and made to empty the bladder; during the day he should be directed to hold the urine as long as possible within reasonable limits, and regular hours for urinating should be encouraged. Feather-beds and too many coverings should be avoided.

Therapeutics.—**Belladonna.**—Enuresis from paralysis of the sphincter vesicæ; the urine flows guttatim and the desire is frequent; dribbling of the urine, difficult micturition; nocturnal enuresis; starting and crying out during sleep.

Chloral.—Nocturnal enuresis, particularly during the latter part of the night.

Causticum.—Involuntary discharge of urine when coughing; enuresis nocturnal, especially during first sleep; frequent, difficult, painful urination.

Equisetum.—Nocturnal enuresis, with or without symptoms of cystitis.

Ferrum met.—Involuntary urination, especially during the day; severe urging to urinate during the day, absent during the night; urine light-colored, letting fall a whitish sediment; urine charged with mucus or pus.

Gelsemium.—Enuresis nocturna; profuse urination; spasm of the bladder; involuntary micturition; paralysis of the sphincter vesicæ; frequent urging, with tenesmus and scanty emission of urine.

Hyoscyamus.—Paralysis of the bladder; involuntary escape of the urine; retention of urine; frequent urging to urinate, with scanty discharge.

Pulsatilla.—Nocturnal enuresis; involuntary discharge of urine; the urine escapes in drops when walking or sitting; spasmodic pain in the neck of the bladder while urinating; chronic cystitis.

Secale.—Enuresis, especially when due to spinal disease.

Sepia.—Nocturnal incontinence, particularly during the first sleep; constant desire to empty the bladder, with painful tenesmus; urine turbid, offensive, with red, sandy, or white sediment.

Sulphur.—Nocturnal enuresis. Scrofulous diathesis.

A long prepuce has been made use of as a means for awakening the child from sleep, by gluing its orifice by means of Collodion, or by the employment of a band of rubber. Thus closed, the preputial cavity will become distended with urine and the pain or discomfort so provoked will arouse the sleeper.

General or local baths of tepid or cold water, preferably containing sea-salts, should not be omitted.

In male patients the introduction of a sound from time to time is many times very beneficial.

Corporal or other severe punishment should be deprecated, not only because it is cruel, but because it is likely to make matters worse, unless the enuresis is wholly due to indolence or bad habits.

RETENTION OF URINE.

Synonym.—Ischuria.

Definition.—Retention of urine is the term employed to designate a condition in which the bladder contains urine, but, for some reason, is unable to expel it.

A sharp distinction must be drawn between the state thus defined, and suppression of urine, in the latter the fault lying with the kidneys, those organs failing to excrete.

Ætiology.—Retention of urine is only a symptom, an expression of some other condition which it is the duty of the physician to discover, for upon its recognition and removal will depend, in the majority of cases, the successful management of the case.

The causes of this condition are very numerous, some of them being inherent to the bladder itself, while others are situated wholly without the viscus.

Again, the causes, whether of the one class or of the other, in the majority of cases act in a purely mechanical way and may be either pathological or foreign in their nature. To the former belong the following:

Paralysis and atony. These subjects being discussed at length in a special chapter, mere mention in this place will suffice.

Coagulation of blood within the bladder. The hæmorrhage may have its origin from several sources, as from the walls of the bladder, from a tumor within that viscus, from the ureters or kidneys, or from the deep portion of the urethra, in the latter case the blood having passed backwards through the meatus internus.

Calculi, false membrane, neoplasms, thickened mucus, simple or inflammatory spasm of the vesical neck, all may produce retention by mechanically closing the internal meatus.

Obstruction to the flow of urine from causes situated wholly without the bladder include: hypertrophy of the prostate and stricture of the urethra, particularly when aggravated by congestion or inflammation; the presence of foreign bodies, calculi, false membrane, polypoid growths, clots, etc., in the urethra.

Pressure exercised upon some portion of the urethral canal or on the neck of the bladder may occasion its occlusion, as priapism with plastic exudation within the body of the penis, due to the use of Cantharides, or lesion of the cerebro-spinal axis. (Gross.)

Abscess, or tumor in the perinæum; a collection of blood in the same region, following injury; extravasation of urine; peritonitis, cellulitis, pelvic hæmatocele, or abscess; tumors of the uterus, broad ligaments, or Fallopian tubes, or in connection with the pelvic wall; misplaced uterus or kidney.

Lastly, we may mention defective volition or hysteria, and miasmatic influences, producing an intermittent variety of retention.

Pathology.—The changes which take place in the bladder depend largely upon the amount of distension to which the organ is subjected, and the length of time during which the retention continues. They are, practically, the expressions of varying degrees of inflammation. In severe cases the walls of the bladder become softened, ulcerated, or gangrenous in patches, leading, perhaps, to rupture and extravasation. The orifices of the ureters are separated, and the inflammation or irritation may extend up these tubes and involve the kidneys, resulting in suppression of urine.

Symptomatology.—When the patient is conscious, and there is no loss of local sensibility, he will immediately direct the attention of his attendant to the bladder. He will complain of a sensation of fulness and distension in the vesical region, and of strong, oft-repeated voluntary and involuntary efforts to empty the bladder. If the retention has existed some hours, the expulsive efforts may succeed in effecting the escape of a few drops, or even a drachm or so, of urine, guttatim or in a feeble stream. Little or no relief is experienced by such escape, and the retention is said to be incomplete. When in spite of the most powerful straining, aided by frequent change of position and manipulation of the penis, no urine can be expelled, complete retention exists.

The amount of pain, other than the bursting feeling, which is experienced during such efforts, depends largely upon how prominent a part the inflammatory process, especially of the vesical neck, plays in the case.

If the cause be inflammation and spasm of the neck of the bladder, or inflammation of the prostate, violent pain in that region and shooting into the rectum, to the end of the penis, down the thighs or into the sacral region, will be complained of, and they add greatly to the suffering. Mental anxiety is more or less marked, the patient being in dread lest the bladder should burst, an accident that rarely happens, however, unless from violence or after ulceration or gangrene have developed.

The abdomen being uncovered, a tumor can *usually* be seen occupying the hypogastrium and extending upwards to a variable distance. Upon palpation, a distinct, fluctuating (best appreciated with a finger of the other hand in the rectum) tumor can be defined, the position of which is not influenced by a change of position; upon exercising pressure on it, pain and a desire to micturate are excited.

Diagnosis.—It seems as though no difficulty could be had in recognizing a distended bladder, but, unfortunately, we have undoubted evidence that this condition has been mistaken for ascites, ovarian dropsy, suprapubic abscess, and even pregnancy, and that these conditions have been mistaken for retention.

The physician may be misled in some cases if he relies entirely upon the statements of the patient or his attendant; the affirmation may be made that the urine flows all right, indeed too freely; the constant dribbling misleads them, and the idea of retention is not for a moment entertained. This state is especially prone to obtain in cases in which the local or general sensibility is lost or blunted; hence, no feeling of distension is experienced, and the bladder fails to make its condition known. In all such cases, therefore, the physician should himself examine the patient, for nine times out of ten there exists retention with overflow. Taking due notice of the symptoms and signs described, the diagnosis is reasonably certain; nevertheless, the catheter should be introduced both to confirm the diagnosis and to afford relief.

While it is true that the successful passage of the catheter into the bladder is usually rewarded by a free escape of urine, confirming the diagnosis of retention, there are yet times when, even though the eye of the instrument is fully within the viscus, no urine will flow although the bladder is full. When the bladder is distended with a large clot of blood and urine, the catheter may afford exit only to a few drops of blood mixed with a little urine. If the prostate is congested, or the urethral canal is unusually tender, the passage of the catheter may provoke a little bleeding, and the blood finding its way into the eye of the instrument will clot and occlude it, the fact not being indicated by any external evidences. Under such circumstances, therefore, it is better, if possible, to employ an instrument with a stylet, at least such an instrument should be at hand for an emergency. The injection of water through the catheter while *in situ* may also be tried, but in our hands this procedure has often failed to clear the instrument, even under all the pressure we could make on the bulb of a Davidson's syringe.

Again, the lower stratum of fluid in the bladder may be so thick with altered mucus, pus, shreds, etc., as to be unable to pass through the eye of the catheter, thus throwing confusion into the diagnosis by the failure of any urine to escape.

The diagnosis is not finished with the mere recognition of the existence of the retention; we must go further, and discover the cause, for generally the treatment must be based upon the correct solution of this question. With this object in view, we briefly learn the history of the case, as to whether a urinary difficulty existed prior to the present attack, and, if so, its nature.

The age of the patient is exceedingly suggestive; in youth we may suspect gonorrhœa with some of its complications; in middle life, stricture is likely to exist; in advanced years we frequently find prostatic hypertrophy.

Prognosis.—The prognosis varies greatly, and rests upon a just appreciation of the cause. When the retention is due to the presence of foreign bodies, pressure of displaced organs, or accumulation of pus, blood, etc., their removal, restoration, or evacuation, as the case may be, affords immediate and permanent relief.

When due to paralysis or atony, the prognosis is favorable or otherwise just in proportion as the cause of these conditions is remediable or not.

When due to stricture of the urethra, the stricture must be cured surgically, else the patient will be exposed to a repetition of such attacks.

In cases of hypertrophied prostate, as in stricture, the attack of retention is acute and due, as has been mentioned, to a sudden congestion or inflammation with spasm, quite likely to still more increase the amount of urine already contained in the distended viscus. In such cases, in the aged, a guarded prognosis should be given, for not unfrequently it has been observed that these attacks of retention seem to be the first evidences of a general breaking-up of the system, a fatal termination taking place in a week or ten days, the unfavorable issue occurring in spite of the bladder being relieved by the catheter or aspirator at regular periods. Sometimes the ability to empty the organ naturally returns before death occurs; but generally the use of the catheter is demanded until the end.

Treatment.—The first duty of the physician, when called to a case of retention of urine, is to gain as quickly as possible the following information: whether the attack came on suddenly or gradually; whether there existed previous genito-urinary difficulty; the length of time the retention has existed; and whether it has been complete, or not.

While these and similar questions are asked and answered, the region of the bladder should be examined. Thus, in a few minutes the attendant will be in possession of sufficient data to make a preliminary diagnosis as to the probable cause, to determine the existence of retention, and to decide whether recourse should at once be had to surgical interference, or not.

The indiscriminate employment of the catheter is highly reprehensible. True, immediate relief can be obtained if it is possible to pass the instrument, but in some cases this provokes undue irritation, increases the congestion or inflammation, and seems to perpetuate the tendency to retention, not to speak of the possibility of exciting urethral fever, epididymitis, etc. On the other hand, it may well be claimed that too much censure cannot be accorded to the physician who will suffer a bladder to become distended to an extreme degree, exposing the patient to the dangers of paralysis, atony, cystitis, gangrene, etc., while vainly waiting for relief from the exhibition of internal remedies, when a catheter can be passed without improper manipulation, or the aspirator can be used readily. Neither the degree of distension of the bladder nor the length of time during which the retention has existed can alone determine when the proper moment for mechanical interference has arrived. The bladder may be hypertrophied and contracted, and so be distended to a dangerous degree when it contains only a few ounces of urine. Or, it may be unusually capacious, and contain two or three pints without its walls being injuriously stretched. Again, the kidneys may excrete very slowly, and many hours may elapse before the bladder reaches the limit of tolerance.

Hence, the critical moment when we should abandon internal medication and auxiliary treatment with the view of affording relief from the immediate retention, and resort to the catheter or puncture of the bladder, can only be determined by a careful consideration of *all* the factors in each given case. Avoid the catheter, if possible; when it is needed, delay is dangerous; to withhold it altogether, is criminal. If the pressure of the retained urine on the neck of the bladder is once removed by its evacuation, no further difficulty may be experienced. Should such a favorable issue not occur, we have at least gained time for the remedies to act and to prevent a recurrence of the difficulty; and should the effort to prevent a recurrence also fail, the catheter should be employed again and again, as often as the individual case demands.

If great difficulty has been experienced in introducing the instrument, and fears are entertained that a second attempt, if needed, might be unsuccessful; or, if circumstances are such that the physician cannot visit the patient at proper intervals, then it is best to tie in a soft instrument. Prolonged efforts to pass the catheter should not be made, particularly in cases due to congestion of the prostate in persons well advanced in years.

If the effort has been made under favorable circumstances, and by this we mean after the exhibition of remedies, aided by hot baths, hot fomentations, chloroform, etc., and the eye of the instrument cannot be made to enter the bladder, the proper course is to aspirate the viscus above the pubes. Should an aspirator not be at hand, the organ should be punctured through the rectum or above the pubes with an ordinary trocar and canula. In a case of impassable stricture the bladder may be relieved through the perinæum, the stricture being divided at the same sitting.

If the cause be an abscess, it should be opened; if an effusion of blood, or an extravasation of urine, it should be liberated; a misplaced organ, restored, if possible, to its normal position; a foreign body in the urethra, removed; or if a calculus engaged in the neck of the bladder or prostatic urethra, it should be pushed back into the bladder or, failing in this, removed by the same incision which is made in lateral lithotomy.

If a clot of blood prevents the bladder from contracting, it should be left to nature, especially if the source of the hæmorrhage has been from the bladder-walls, its neck, or from a tumor within the organ. An attempt to break up the clot involves a great risk of provoking fresh bleeding. If, however, the distension is great, then the clot must be broken up with the catheter, used as gently as possible.

In hysterical retention the catheter should not be used, except under the most urgent necessity, for, if once employed, there is a strong likelihood that it will have to be used repeatedly.

Therapeutics.—**Aconite.**—Pain in the region of the bladder, retention of urine, frequent and severe urging to micturate, passing only a small quantity of red, turbid urine; stitches in the kidneys; great restlessness and anxiety; skin hot and dry.

Arnica.—Ischuria or tenesmus, ineffectual urging to urinate, especially if the result of a fall or mechanical injury; urging, the urine dropping out involuntarily.

Arsenicum.—Workmen employed in the sublimation of Arsenic are frequently troubled with vesical disturbances, especially retention of urine, and catarrh of the bladder and urethra. Urine scanty, passed with difficulty and burning; retention, as if the bladder were paralyzed; violent desire to urinate, with inability to void any; tenesmus and strangury; involuntary emission of urine during sleep.

Dulcamara.—Retention of urine, strangury, constant but ineffectual urging to urinate; painful pressing about the bladder; catarrh of the bladder; urine turbid and white, mucous sediment in the urine; fetid odor, oily urine, jelly-like or tough, red or white, mucus mixed with blood.

Hyoscyamus.—Paralysis of the bladder; retention of urine; frequent urging, with scanty discharge.

Opium.—Retention of urine. Atony of the bladder; dark-colored urine.

Pulsatilla.—Retention of urine, particularly in children; inability to empty the bladder; retention from cold; constant urging; spasmodic pain in the vesical neck when urinating; incontinence of urine; involuntary discharge of urine; burning in the urethra when urinating; urine scanty, of brownish-red color, with brick-colored sediment; bloody or mucous deposit.

Rhus.—Retention from cold, especially in children; urine discharged in drops; dark urine, almost bloody; tenesmus vesicæ.

Consider *Atropine*, *Aurum*, *Belladonna*, *Cantharides*, *Causticum*, *Laurocerasus*, *Nux vom.*, *Plumbum*, *Secale*, *Spiræa*, *Sulphur*, *Zinziber*.

Certain remedies, used empirically, frequently prove advantageous; thus, when spasm is the cause, the tinct. ferri perchloridi, 15 to 20 drops, in a little water, at a dose, repeated every fifteen minutes for four or five doses, is markedly successful. A piece of ice, the size of a hickory nut, introduced into the rectum, and repeated three or four times, will sometimes be efficacious.

Opium, in material doses, has the same effect by favoring relaxation, but chiefly by diminishing the sensibility, and so preventing the violent straining efforts. Chloroform or ether act much in the same way, and are valuable agents.

Lastly, the hot baths, continued for only fifteen minutes or so, the object being to relieve deep congestion by producing a determination of blood to the surface; long baths are to be avoided.

When it is necessary to employ a catheter, a soft instrument of medium size should be chosen in preference to a solid one. If there is prostatic inflammation, a No. 15 (French scale) is about the proper size.

If the case is seen for the first time, and the distension is great and has existed many hours, all the urine should not be evacuated at once, for fear of unfavorable results from suddenly removing the support of the bladder-walls. Withdrawing a portion of the urine, the catheter should be left *in situ*, and its orifice plugged. After an hour or two another portion may be allowed to escape, and so on until all has been voided; thus the bladder will gradually accommodate itself to the altered conditions and be supported by the abdominal bandage which is to be applied.

VESICAL CALCULI.

BY J. G. GILCHRIST, M.D.

Stone in the bladder is, in a large number of instances, simply a later stage of renal lithiasis. A calculus is formed in the kidney, and passes along the ureter to the bladder, where it becomes engaged in some of the folds or processes of the lining membrane, caught under an enlarged prostate, or is too large to pass out of the body through the urethra. Such is the usual history of vesical stone, and the condition is one to be studied in connection with diseases of the kidneys. The subject has already been discussed in a preceding chapter. But renal lithiasis is not the only source of urinary calculi; they may originate in any part of the urinary tract, ureters, bladder, or urethra. The distinction is not without interest and value, as well to the physician as to the surgeon, inasmuch as questions of therapeutics and prognosis have an intimate relation to the mode and manner in which the stone was formed. A stone in the bladder, derived from the kidney, represents a morbid state which, unless relieved, may furnish other stones after the removal of the one then under observation. Hence, there is a *vital* element in its ætiology which must receive the attention of the physician. The stone is formed because there is a defect in assimilation, something wrong in the domain of physiological chemistry. A stone originating in the bladder, however, represents something vastly different. Here the cause is to be searched for in the domain of inorganic chemistry, and the stone is not always to be considered a result of morbid action. In such a case, the removal of the stone may be considered a cure of the patient, as there may be no causative morbid action back of the formation of the calculus. Thus it can readily be comprehended that the physician and the surgeon have an interest in determining the question of origin: in the one case having to treat an individual, in the other, practically, a mere foreign body to remove. As a rule, there are no great obstacles in the way of a diagnosis in this particular, more especially as in either case the stone is to be removed, and direct inspection will rarely fail to furnish the required information. It will be necessary, however, to take up the study somewhat in detail and systematically, presenting, first, the symptoms ordinarily observed, and next, an analysis of their significance.

Symptomatology.—There are many cases, possibly a majority, in which the commencement of stone is in some disease of the bladder, oftener of inflammatory character. This fact greatly complicates a diagnosis, particularly as to the origin of the calculus, inasmuch as the earlier symptoms of stone are almost precisely of the same character. While the subjective symptoms are pronounced, and can scarcely be misinterpreted when joined to other and more positive indications, an accurate diagnosis can never be predicated on them alone; the crowning test is the objectivity, which may be said to be unique and absolutely unmistakable. And yet, even here there are sources of error, not in the symptoms themselves, but in an imperfect elicitation of them.

The first symptom of vesical stone usually appears some days after the partial or complete subsidence of some inflammatory or irritative disease of the bladder or some traumatism. They may, in more chronic cases of cystitis, and the like, appear during the progress of the disease, and, consequently, be very obscure. These early indications are a feeling of weight in the region of the bladder, frequent urging to urinate, and itching of the meatus and preputial orifice. These symptoms gradually increase in severity until the urging to urinate is almost constant, the urine escaping either in drops when the stone is lodged in the neck of the bladder, or being suddenly cut off by the stone falling into the prostatic urethra as it is carried along in the stream of urine. Soon the urine becomes turbid, if it has not been turbid at an earlier stage, perhaps bloody, or full of mucus, in some cases pus, in greater or smaller quantities, being present. The bladder, particularly the prostatic portion, becomes excessively irritable and ultimately inflamed; the itching of the prepuce and meatus becomes so great that the former is elongated and the latter reddened or excoriated by the pulling and friction to which it is subjected. The bowels become constipated, and the general health soon suffers from the sleepless nights and troubled days growing out of the almost constant vesical irritation. Finally, in aggravated cases, urine can only be passed in the recumbent posture, sometimes lying on the side, sometimes on the face, or even a catheter may be required. The straining to empty the bladder, and its frequent repetition, may induce prolapsus of the rectum, or even hernia. These symptoms represent an aggravated case, it is true, and yet such is the actual character of the great majority. The whole aspect of the case is one of chronicity, and hence a suspicion of cystitis would have no foundation. It might, and often does, resemble prostatic hypertrophy, and, indeed, this gland will very frequently be found much enlarged. Notwithstanding these facts, the chronic character of the case, together with the acute sufferings and the unique symptoms, can scarcely fail to put an intelligent observer on the right track. While there may be a moral certainty already, none will risk a diagnosis on the subjectivity alone.

A physical examination is made as follows: Place the patient on the back, with the knees drawn up and somewhat separated, precisely as for catheterism, and pass a steel sound, of proper size, into the bladder. The sound should not be too small, for fear of injuring the urethra or the contracted bladder, and yet not so large that it cannot be freely manipulated. Perhaps, in the majority of cases of adults, a No. 8 (English) would be preferable. The sound must be warmed by dipping it in hot water, and well lubricated with oil or vaseline. If its introduction is painful, an anæsthetic must be used, for it is absolutely indispensable that the examiner should have every facility for a thorough and complete investigation. The new anæsthetic, Muriate of cocoaine, is said to be particularly useful in this connection. It is used by injecting deep into the urethra, through a long-nozzled urethral syringe, about five drops of a four per cent. solution, and, after waiting five or ten minutes, passing the sound; if still painful, the sound is to be withdrawn, and another application made of the anæsthetic, when, the preparation being reliable, the sound can be passed without pain. This agent, at the same time that anæsthesia is secured, induces perfect muscular relaxation, so that the movements of the sound are unrestricted. Even under anæsthesia the sound must be introduced with gentleness, and manipulated in the same careful manner.

Having entered the bladder, the beak is first turned under the prostate; if no stone is found there, the point is to be swept over the entire floor of the bladder, moving it systematically, so that no portion is overlooked. If no stone is found, have the patient change his position, or even stand up, and repeat the movements. Being still unsuccessful, withdraw the sound, and inject enough warm water into the bladder to distend it and smooth out the folds. In old cases, this last will be very imperfectly secured, as the viscus is contracted and much thickened. Now reintroduce the sound, and repeat the movements. In one way or another, the surgeon will rarely fail to find the stone, a fact communicated by a distinct click, both felt through the expanded head of the instrument, and heard. And yet, the click may be supposed to be heard, and no stone will be present; and, on the other hand, no stone may be found, and yet a large one be really present. How is this to be accounted for?

Signs of stone and no stone present, are to be accounted for in various ways. In the first place, some inexpertness of the examiner may nearly always be ascribed, *but not always.* Some of the first surgeons in the world have made such errors. Sometimes the promontory of the sacrum has been mistaken for stone, and the absence of the click has been ascribed to its soft character. Sometimes a ring on the finger of the surgeon, some ornament on a watch chain, or even a button on his clothing, has come in contact with the sound. If much oil has been used, there is sometimes a sucking sound on moving the instrument, which has been mistaken for the click. And so the sources of error, if not *in*numerable, as some one has said, are at least sufficiently numerous. This suggests the propriety and necessity for removing articles of clothing that might lead to a mistake.

No sign of stone, and yet a calculus present, is also readily accounted for. Unlike the former, inexpertness is not so frequently to blame in this case; the mistake may be made by the most skilful almost as readily as by the ignorant. The stone may be encysted or sacculated; it may be deeply imbedded under the prostate; it may be of such light specific gravity that it floats in the urine; it may be so small that it is easily overlooked. The sources of error here are very numerous, and of a character that might well mislead the most acute observer. In fact, so generally do surgeons appreciate this, and so frequently have the best diagnosticians been deceived, actually cutting for lithotomy, and finding an empty bladder, that it has passed into a rule of practice with some to have "a stone in your pocket when about to operate, that you may have something to show the family and friends if none is found in the bladder."

In the case of women, the sources of error are somewhat less patent, for the reason that the shortness of the urethra admits of a more direct examination, instrumental, digital, and ocular. Yet even in these cases mortifying mistakes have occurred.

The sources of error being so many, and valuable, yes *in*valuable as the sound must be, other measures should not be forgotten. Thus, in the case of the female, the bladder may be explored by dilating the urethra with the finger; or, should this be impossible, for any reason (as the youth of the subject), vaginal examination may be useful. In the case of the male, equally valuable information may be obtained through the rectum. In this case, anæsthesia being secured, the whole hand may be introduced, if required, and the posterior wall of the bladder thoroughly explored.

Before leaving this branch of my topic, one very important fact remains to be mentioned. There are cases in which the symptoms of stone have been most pronounced, both subjective and objective, and yet suddenly they have all disappeared, so completely that the most careful sounding cannot detect one. This is due to the sudden encystment of the stone; it has fallen into a hypertrophied mucous fold, and become encapsulated. Other cases are noted of an opposite character. Symptoms of stone suddenly appear, and are of great urgency. Examination shows a large stone, and of a size that forbids the idea that it was so suddenly produced. This is due to the release of a stone, previously encysted, by some sudden movement or jar of the body. Such accidents have been mistaken for rupture of the bladder, some of the symptoms being not unlike those accompanying that grave accident.

Let us now inquire into the causes operating to produce a vesical stone, excluding all questions purely relating to renal lithiasis or any causes operating outside of the bladder.

Ætiology.—It is impossible for urinary salts to crystallize in the bladder, the urine being of normal temperature, without a nucleus of some kind. The existence of a stone in the bladder, therefore, is dependent upon a nucleus, organic or otherwise. The kind of stone will depend upon the kind of nucleus. Alkalinity of the urine will produce excess of phosphates; if ammonia is the alkali, we have what is known as the "triple phosphate," or the ammoniaco-magnesic phosphate. If the urine is unduly acid, the result will be oftener a uric acid or oxalic acid stone. It has been thought, by some observers, that there is a close and important relation between the kind of nucleus (organic or inorganic) and the urinary reaction, thus affording some clue to the source of the stone from its physical characters. A hard nucleus, such as metallic foreign substances, introduced from without, seems to excite an irritation of the vesical walls resulting in alkaline changes in the urine. Thus we find calculi produced around such nuclei almost invariably phosphatic. This has been my own experience in a number of cases. Hairpins, pieces of metal, pistol balls, pieces of bone, have each been found the nucleus of phosphatic stones I have seen; other surgeons of larger experience could add to the list. Soft nuclei, on the other hand, seem to give rise to acidity, and we find clots of blood, drops of mucus, or masses of epithelium, quite constantly the nucleus for uric or oxalic acid stones. Why these different results should follow the different kinds of irritation, I cannot tell. The facts seem to be as stated, however, in the experience of most surgical practitioners. The clinical value of these facts, if such they are conceded to be, lies in the following: Stones in the bladder are roughly classed in two groups, the *simple* and the *compound*. The former are those in which the stone is composed of a single substance, excluding the nucleus. The latter are those in which a number of substances are found, arranged for the most part in laminæ. Now, on examining a stone, if it is uric or oxalic acid, the presumption is, when there is but *one* stone, that it was formed in the bladder. On breaking it open, if the nucleus, as is quite certainly the case, is organic material, the presumption almost amounts to a certainty. Should there be multiple calculi, the mere fact of multiplicity may be taken as proof of renal origin, without reference to the nucleus. The stone, on the other hand, being phosphatic, the presumption is that it originated in the kidney, but the nucleus must be examined in order to determine this question. If a crystal of uric or oxalic acid is found to be the nucleus, renal lithiasis, past or present, may be asserted. A hard nucleus of some substance derived from without, as metallic particles, or from traumatism, as bone-splinters, determines its vesical origin. It requires no argument, therefore, to emphasize the importance of examining into the formation of a stone, for purposes of diagnosis and prognosis as well as for therapeutics.

Diagnosis.—Differential diagnosis between calculus and other diseases can be rarely called for if the sound is used intelligently. At this time I shall have little, if anything, to add to what has already been stated, but shall speak of the methods used to determine the source of the calculus, by means of microscopic examination, including such questions as weight, size, consistency, number, shape, color, or other physical characters of the stone. Frequently, means are not at hand for a minute examination of a specimen immediately upon its extraction from the bladder, and much benefit will be derived by being enabled to form at once an opinion as to its origin, renal or vesical.

Number is an important element. They vary from one to a thousand, or more. When there are many calculi they are probably due to renal disease, the disease being still active. When single, the probabilities are that the origin was vesical. Should a nucleus of uric or oxalic acid be found, while it was probably formed in the kidney, yet, there being a single stone, the presumption is that a former renal disease has ceased to be operative. Single stones also are usually phosphatic; when there are a large number, they are probably of uric acid.

The *size* may vary from a grain of wheat to that of the fist. The larger the stone, the more likely it is to be phosphatic; oxalates come next in point of size, and uric acid last. The average size, taking all kinds of stones as they would be found in a series of cases, would be about that of a large chestnut.

Weight varies greatly; it may be anywhere between a very few grains and, as in one case recorded by Holmes (*Surg.*, iv., p. 1015), the enormous weight of 61 lbs. 3 oz. The heaviest stones are the oxalates, next the uric acid; the lightest being the phosphates.

Shape is not uniform. Some are regular, fusiform or rounded, without sharp angles, and rather smooth surface. These are usually multiple, and owe their form to attrition. They are usually renal. Others are tuberculated, having what is called the "mulberry" appearance; they are oxalates, as a rule. Others are very irregular, "dumb-bell," and the like, from a direction given to their growth by the parts with which they are in contact; these are usually phosphatic. In some cases the earlier formation of a calculus is encapsulated or encysted, and later accessions project into the bladder, giving a peculiar shape. Calculus formed about some foreign material will have a form determined by the shape of the nucleus.

Color is a very important symptom. The phosphates are white, sometimes tinged with other colors. The uric acid stones are yellow or pale brown. The oxalates are dark brown or greenish black.

Consistency varies greatly. The oxalates are the hardest, the uric acid coming next, the phosphates being very soft or friable. Occasionally phosphatic deposits are of the consistency of mortar, but usually have sufficient tenacity to preserve their shape, but are always friable and of loose texture.

Odor may occasionally assist in a diagnosis. The phosphates, particularly the triple variety, have an ammoniacal odor, the oxalates seminal. Uric acid is quite odorless.

The careful study of the clinical history of a case, and observation of the physical characters of the stone, as given above, will rarely fail to lead the surgeon to a correct conclusion as to the source of the calculus. Should any of the characters be obscure or contradictory, an appeal must be had to the microscope. Contrary to what might be expected, urinalysis yields negative results as a diagnostic factor. It is true that in many cases, possibly the majority, an excess of lithates may be found, and the character of a recognized stone be detected thereby. But, in the absence of a stone detected by other means, an excess of the lithates is so common an occurrence without any stone, that the evidence at best can only be considered complemental. Then, on the other hand, there are very many cases in which there is stone, all the rational signs being present, yet the urine will be found singularly free of all the elements of stone formation. Something can unquestionably be told of the source of a stone from examination of urine in which free lithic elements are found. Thus, an excess of uric or oxalic acid would indicate renal disease, in which case the urine itself might be perfectly normal in appearance and macroscopic physical characters, without unusual odor; it would be likely to be unduly acid, however, and might contain more or less blood or albumin. Should phosphates, single or triple, be found, a vesical origin might be determined, the urine then being of neutral reaction, strongly alkaline, or faintly acid; it would be turbid, smell very offensively, particularly after standing, as decomposition occurs early, and might show traces of pus or mucus. Thus, from every point of view, microscopically and macroscopically, the composition of the urine can only be of value as confirmatory or completing evidence of what can readily be determined without its examination. The *only* certain test is the sound, and we have learned that it is possible for even this instrument to mislead.

Prognosis.—A case of vesical calculus, so far as its natural history is concerned, is always to be considered a fatal one. Art materially alters this, as recovery is now the rule; the prognosis is only bad when the case is left to run a natural course. The fate of the stone, if left to nature, is either to become encysted, perhaps completely enveloped in mucous tissue; to set up violent inflammation and pass into the rectum, vagina or pelvis through the opening; or to cause contraction and hypertrophy of the bladder, with such an obstruction to the passage of urine that the ureters and kidneys become dilated with all the attending evil consequences. The patient becomes worn out through the incessant pain and irritation attending the frequent calls to urinate, more particularly the pain caused by the contraction of the bladder on the stone after the urine has been voided. The broken sleep, from the same causes, adds to the havoc of all the vital forces. All the functions of life become disturbed, and uræmic poisoning finally appears, and thus closes the scene. Should the stone find its way, by ulceration, into the pelvis, cellulitis and pelvic abscess with peritonitis must result. If the passage is into the rectum or vagina, a fistula will necessarily form, which may become permanent, although a spontaneous closure is not impossible. Such cases, however, are extremely rare, so much so that many writers make no mention of them. There are cases, very exceptional, in which the symptoms come on so suddenly and are so extremely violent that speedy relief is imperative to save life. An individual may have had symptoms of stone, and after a severe jarring injury or direct force to the bladder, suddenly alarming symptoms appear. The pain is agonizing, urination is frequent and painful, the urine being more or less bloody. The blood may sometimes come away in such quantities that it amounts to a hæmorrhage. One of two things has happened; either a previously encysted stone has been thrown out of its bed, or a stone already free has been broken. In the first case the sharp angles of the fractured calculus wound and irritate the sensitive mucous surfaces, producing a more or less severe hæmorrhage, or an exceedingly violent cystitis in the other. The agony is too great for human endurance, and speedy relief is imperative.

Considering the condition as one brought to the surgeon for treatment, where no restrictions or fetters are imposed upon his judgment, unless the case is brought very late, when serious and irreparable mischief has already been done, as far as the stone in the bladder is concerned, the prognosis is good. If there is a lithic disease, however, other considerations, already alluded to in the proper place, obtain; but even here I may add, that a cure is quite the rule and may be confidently expected; this, of course, if there has not been too long delay.

Treatment.—The treatment of stone in the bladder is purely surgical. With renal lithiasis we have, in this place, nothing to do. I am aware that extravagant claims have been made as to the efficacy of various methods of treatment that are designed to avoid the necessity for an operation. There is no question that they are each and all utterly futile and useless. The stone being once formed, there is absolutely nothing else to be done than to remove it from the bladder in the speediest and safest manner. Solvents, galvanism, remedies of all kinds are not only utterly valueless, but even dangerous, as they postpone radical treatment to a period when the patient is in a less promising condition.

This is not the proper place in which to discuss at any length the indications for different methods of operating. In general terms, at least such has been my own practice, the particular operation is to be determined by the size and characters of the stone. We may classify the operations under two heads, the cutting and the crushing. The former, or lithotomy, may be divided into perinæal, supra-pubic, vaginal, or rectal. A choice between these methods is to be determined by the *size* of the stone. A stone of moderate dimensions, say not larger than a hickory-nut, may always be extracted through a perinæal opening; larger stones may pass through without damage, or may be broken and removed piecemeal. I prefer, however, to remove very large stones otherwise. In women, when too large to pass through a dilated urethra, they may be removed through vaginal incision. Very large stones may be removed through rectal incision or hypogastric. The latter has been quite successfully performed of late years, particularly by my friend Professor William Tod Helmuth, who has published his experience in a monograph. The rectal method has been quite frequently performed by Professor Bauer, of St. Louis, Mo., and with gratifying success.

Crushing operations I have never wholly liked. They should be reserved, I think, for calculi of soft or friable consistence, such as phosphatic or uric acid stones, as the danger of breaking a lithotrite in the bladder is not entirely imaginary. The old operation of lithotripsy has been nearly entirely superseded by the method of litholopaxy, so greatly improved by Professor Bigelow, of Boston. The details of these operations are not germane to our present study, and must be sought in works on surgical practice.

Should the stone on examination be found to be of renal origin, its simple removal cannot be considered a cure of the disease. Remedies must be used to remove the lithiasis, such as *Arsenicum*, *China*, *Lycopodium*, *Nitro-muriatic acid*, and others, as laid down in a preceding chapter.

DISEASES OF THE GENITAL ORGANS.

A. DISEASES OF THE MALE GENITAL ORGANS.

SPERMATORRHŒA.

BY H. R. ARNDT, M.D.

Synonyms.—Gonorrhœa vera, Pollutiones nocturnæ et diurnæ; (Engl.) Pollutions; (Fr.) Flux de sperme, Pertes séminales; (Germ.) Pollutionen; Unfreiwillige Samenerguesse.

Definition.—The discharge of seminal fluid "occurring without voluntary sexual excitement" (Cantlie), depending upon, and accompanied by, symptoms of nervous exhaustion and irritability of varying degrees of severity.

Ætiology.—Whatever weakens or irritates almost any portion of the genito-urinary apparatus or affects the nerve-centres and nerves standing in direct connection with it, may become a causative factor in the production of spermatorrhœa. The long-continued practice of masturbation, by the mechanical irritation produced locally, by weakening the functional and even structural integrity of the sexual organs, by the wear and tear upon the nervous system, particularly in the sexually immature, and by the waste of a highly organized material, becomes a most important factor in the production of this affection. On the other hand, a number of conditions, by producing local irritation, congestion, and hyperæsthesia of the genitalia, lead to the establishment of masturbation, especially in young persons, who, but for this constant irritation of the sexual organs, in the absence of evil example, would have remained free from this vice. To this category belong: abnormal length and narrowness of the prepuce, phimosis, balanitis, constipation, hæmorrhoids, itching eruptions at the anus and scrotum, intestinal worms, irritation and catarrh of the urethra, etc. The importance of masturbation, not so much as an exciting and predisposing cause of spermatorrhœa as of a number of other affections, has been somewhat exaggerated in the past. The habit is almost universal, and careful observation shows that very many persons suffer in no respect from previous indulgence. The tendency at present is, however, to make unduly light of a vice which, even if its consequences are not in all cases of a serious nature, is nevertheless responsible for the existence of an immense amount of mischief. In the sexually mature, it is evident, the habit is odious chiefly on moral grounds, unless carried to an extent which results in so great a waste of seminal fluid that the draft made impoverishes the system. It is, however, by no means wise to ignore the moral question involved, and to lose out of sight the results likely to occur eventually from the lowered and debauched moral tone of the person afflicted. In the sexually immature, masturbation, in spite of all arguments to the contrary, works most serious trouble. The irritation and congestion of the sexual organs, tending to a premature ripening of the sexual apparatus, and to a morbidly active state of the sexual appetite in boys of tender years, becomes an important factor in the formation of character, leads the boy to seek associations and pleasures of the most questionable propriety, and, unless counteracted by patient and judicious management, eventually ruins young persons who possess many qualifications for a useful and honorable career. The effects of the vice upon the nervous system in the young child cannot be over-estimated, and in the boy who inherits a sensitive and easily disturbed nervous organization they become exceedingly grave. The writer knows of a number of cases in which, at the establishment of puberty, a state of nervous irritability and of constant and uncontrollable sexual excitement existed as the result of masturbation in boys of a neurotic tendency, which the most patient and skilful management on the part of parents and physicians was never able to completely overcome. Adding to this the fact, which can be verified in the experience of almost any careful and intelligent practitioner, that excessive masturbation in young children leads to a lowering of "tone" of the "reserve force" of the system, which makes them an easy prey to the attacks of nervous, and particularly tubercular, affections, and which greatly favors the early development of inherited tendencies to certain diseases, among which tubercular affections again stand prominent, it is evident that a careless treatment on the part of the profession of so serious a vice would under no circumstances be excusable.

Other disorders of the genital organs may excite spermatorrhœa, as relaxation, dilatation, or irritation of the excretory ducts of the seminal vesicles, irritation and erosion of the mucous membrane of the prostatic portion of the urethra, chronic inflammation of the bladder, particularly of the neck and especially in persons of a pronounced lithic habit, local irritation accompanying gleet, varicocele, etc.

Many of these conditions, enumerated by the authorities, are, however, of less importance as direct factors in the production of true spermatorrhœa than appears at first glance; they are far more likely to give rise to various discharges from the urethra which lack the one characteristic of spermatorrhœa vera, i. e., the presence of spermatozoa, and which, strictly speaking, deserve little, if any, consideration in this connection.

Involuntary escape of seminal fluid frequently occurs in the course of severe, exhausting diseases, and is then the result of general debility, with especial involvement of the nervous system. Such cases recover with the disappearance of the causative disease and the return of the system to its accustomed vigor.

Recent investigation tends to give plausibility to the assertion that spermatorrhœa is in many cases one expression of a general breaking down of the nervous system, of "impoverishment of nervous force," and is a manifestation of what the late Dr. George M. Beard described as the "neurasthenic state." The views of this author are stated at length in the many papers and monographs published by him on various functional affections of the nervous system, and in their application to spermatorrhœa are discussed at some considerable length in his "Sexual Neurasthenia." The argument employed is ingenious, and the facts stated correspond in the main with the writer's experience, based upon careful observation and study of a tolerably large number of cases; it rests chiefly upon the peculiar susceptibility of the sexual apparatus to disturbances of the nervous system, and the promptness with which the functions of the former are disturbed, without at once affecting the whole body, when the nervous system gives evidence of permanent lack of tone; referring to the known close relationship between the nervous system and the reproductive system of women, Dr. Beard affirms that "phimosis, redundant prepuce, varicocele, irritable testes, urethral contractions, and, above all and pre-eminently, irritations and congestions of the prostate and *prostatic urethra*, with spermatorrhœa," hold to many nervous symptoms in men the same relation which "laceration of the cervix and perinæum, irritations, congestions, and displacements of the uterus and ovaries" hold to the nervous affections of women.

Description and Symptoms.—In order to obtain a correct understanding of the ground covered by the much-abused term spermatorrhœa, it becomes necessary to remember that seminal emissions, *per se*, are far more frequently normal and physiological, the mere mechanical relief of overdistended seminal vesicles, than pathological in their nature; when purely physiological, they have no place whatever in the discussion of this subject. Sexual maturity and the possession of sexual desire go hand in hand; in exceptional cases the life of a young man may be so arranged and his health, both physical and mental, so nicely adjusted, that he is scarcely conscious of the existence of sexual desire until love and marriage bring with them at the same time the awakening and the normal and healthful gratification of this passion. In the vast majority of cases such a state of affairs does not exist. If the boy has escaped falling a victim to the vice of masturbation, and has reached the years of puberty untainted, the habits of civilized society, the indulgence in social pleasures, stimulants, the reading of novels, constant intercourse with women under circumstances more than likely to arouse the latent sexual passion, as, for instance, in the dance, all these combined render it highly improbable that many men may reach years of maturity without having experienced seasons of sexual excitement which naturally terminate in a copious emission of semen, preceded by erection, lascivious dreams, orgasm, and not followed by any untoward symptoms. Such an experience once had, a recurrence is more than likely to take place, even in men remarkably strong and in every way well balanced. The same may be said of persons who have been in the habit of finding natural or unnatural gratification of the sexual appetite, and who suddenly desist. The habitual masturbator cannot expect to discontinue the practice without having recurring periods of sexual excitement, with emissions, and men who have regularly satisfied their sexual desire, whether unlawfully or in the marriage-bed, are almost sure to have occasional emissions, with erection and amorous dreams, if by necessity or choice they are deprived of the accustomed pleasure. But in all such cases no grounds whatever exist for apprehension, even if the emissions occur at comparatively short intervals, *so long as the general health remains good.*

When the emissions are followed by symptoms of depression or weariness, malaise, nervousness, and irritability particularly marked on the day following the emission, it is well to treat the matter with some consideration and to act upon the presumption that the condition is approaching the line of demarcation which separates the practically physiological from the probably pathological. It is not always an easy matter to decide at what point the necessity for interference arises, since different constitutions bear a varying amount of sexual gratification, and the physician, if called upon, must base his opinion and advice upon a very careful study and a judicious comparison of all the circumstances which surround the individual case. The difficulty of giving sound advice is greatly increased by the fact that the statements of the patient are in many instances without value, if not positively misleading. Very frequently a perfectly well man, well to all intents and purposes, is frightened out of his wits by an unscrupulous practitioner or by some one of the many advertisements and pamphlets scattered all over the land for the single purpose of robbing the inexperienced, and he can hardly be persuaded that the exercise of a little common sense is all there is required to insure for him good health and peace of mind. On the other hand, those who are really in need of the physician's care are generally so utterly demoralized that they suffer from an astonishingly perplexing set of symptoms, more especially of a nervous character, and, worst of all, are so universally given to evil practices which to abandon they have not sufficient firmness of will, and are morally so disarranged, that the experienced medical man will place little dependence upon any statement made by them, no matter how solemn the assurance of its truthfulness.

To constitute a case one of *true* spermatorrhœa, the emissions of semen must not only be involuntary, and accompanied with certain constitutional disturbances, chiefly of a nervous character, which will be described hereafter, but there must exist a state of weakness of the genital apparatus which permits the escape of seminal fluid during the acts of urination and defecation. Such cases are comparatively rare, and when they occur should receive very careful attention. The first symptom of spermatorrhœa consists in an emission of seminal fluid, preceded by erection accompanied with lascivious dreams, at first occurring in the night, preferably toward morning, after a time taking place during the day as well, and taking place with sufficient frequency to leave the patient depressed, weary, irritable, and moody. After a time, varying greatly in different persons, the ejaculations take place more frequently, the erections and concomitant sexual pleasure become less pronounced, and sooner or later disappear entirely, so that an emission may take place without any evidence of erethism. This state continuing, the sexual organs become hyperæsthetic, so that the slightest touch, as friction of the clothing when walking or riding, is sufficient to bring on an emission; the nervous system also becomes more profoundly disturbed, the patient, regardless of time or place, is annoyed with lascivious fancies and the discharge of seminal fluid. In the meantime he suffers keenly from nervous irritability, becomes distrustful of himself and others, courts solitude, gives himself up to despair, fancies he is absolutely beyond aid, grows sleepless, and is altogether in a wretched conditon. If he masturbates, he forms resolutions to discontinue the habit, and may succeed for a few days, only to return to the vice with an abandon bordering upon the insane. His self-respect seems lost, and he is in a pitiable condition from the fixed belief that others suspect the nature of his affliction and loathe him for it. Not only does an ejaculation of semen take place upon the slightest provocation, but every attempt to strain, the act of urination, the passage of a stool, leads to the more or less free escape of semen, and spermatozoa are present upon the linen and in the urine. Headaches, vertigo, noises in the ears, deafness, indistinct vision add to his suffering; the memory becomes seriously impaired; inability to add a column of figures is one of the early symptoms expressive of profound disturbance in the nervous system; numbness along the spine and in the extremities afflicts him, and gives color to the fear that paralysis will overtake him soon. In the meantime, if an attempt is made at normal sexual intercourse, it is unsuccessful; the erection is imperfect or wholly absent, the introduction of the organ becomes difficult or impossible, or, if partly successful, an emission takes place at once upon the introduction of the organ, creating disgust and discouraging future attempts, resulting finally in complete impotence.

The appearance of such a patient expresses the utter despair which has taken possession of him. He looks haggard, weary, old far beyond his years; his countenance is sallow; the eyes are dull, often surrounded with dark rings; the face is void of expression, his eye seeks the floor save when he casts an occasional suspicious glance at those about him; his gait is dragging, he complains of indigestion, irregular and rapid action of the heart, and, often, of flashes of heat and of frequent urination; the hands are inclined to be cold and clammy, and the continuous brooding over the helplessness and hopelessness of his situation leads to the contemplation of suicide, which is at times carried into effect. Other constitutional manifestations, except those of anæmia, are usually absent; Beard states that examination of the urine in many of his cases has shown the presence of oxalates, urates, and phosphates in excess. Paralysis or organic disease of the spinal cord do not occur in spite of the alarming disturbances in the nervous system.

Many of the mental symptoms described are presented by a class of men who often seek the advice of a physician under the honest belief that they are almost beyond the reach of help, while, in fact, they are in good health, being only frightened by the exaggerations and lies of the impostors who take advantage of the ignorance of the masses for the sake of deliberately robbing them; such cases, described as cases of " imaginary " or " spurious " spermatorrhœa, illustrate beautifully the effect of the imagination upon even the most robust. To the physician the management of these spurious cases often presents much difficulty, since the idea of being in a precarious state of health has so completely taken possession of the victim that it may require, on part of the patient, a long acquaintance with the medical man and profound confidence in his ability and honesty, and, on part of the physician, the exercise of considerable judgment and tact, to dispel the gloomy imaginings which have made the life of the patient a burden to himself and others.

Pathology.—The older writers upon this subject, notably Lallemand, taught the dependence of spermatorrhœa upon an irritated, congested, and inflamed condition of the prostatic portion of the urethra and of the seminal ducts; in fact, their treatment, consisting chiefly in the direct application of nitrate of silver to the presumedly affected parts, was wholly based upon this view. More recent authorities are strongly inclined to look upon spermatorrhœa as a neurosis pure and simple, involving the sexual apparatus and the lumbar portion of the spinal cord.

Diagnosis.—The differentiation between a blenorrhœa or specific discharges from the urethra and a seminal emission can be readily made from the history of the case. The presence of spermatozoa in the urine, or in the stains upon the linen of the patient, is positive proof of the existence of spermatorrhœa. The examination, for obvious reasons, must not be made when there exists the possibility of recent sexual indulgence, either by an embrace or by masturbation. Under the microscope the spermatozoa can only be mistaken for vibriones; the former are about five times as long as the latter, present distinctly the head and tail which are wholly characteristic of the spermatozoa, and under favorable circumstances may show their characteristic movements—a property which is, however, always lost when they have been exposed to the action of urine, which is fatal to the life of spermatozoa.

Patients are frequently seriously and uselessly alarmed at the discharge of prostatic fluid or of fluid from Cowper's gland, which somewhat resembles the white of egg, mistaking it for seminal fluid.

Prognosis.—Spermatorrhœa is essentially chronic, save in those cases of debilitating sickness in which it occurs to disappear of its own accord so soon as the system regains its usual vigor, or in locomotor ataxia where it, in exceptional cases, is observed during the first stage, but, later, passes off without treatment. In the vast majority of cases, in fact almost always, there is good prospect of an eventual cure under appropriate treatment.

Treatment.—Whenever the physician has evidence of excessive masturbation in a case, or of serious impairment of the functions of the sexual apparatus, or of a well-pronounced tendency to a neurasthenic state, he should at once advise such measures as will reduce to the minimum the danger of probable serious harm. First of all, existing causes of danger should be promptly removed. If the patient masturbates, every effort should be made to insure abstinence from this habit. In a young boy, reasoning and a candid and forcible statement of the nature of the sexual functions, the importance in after-life of a sexually strong constitution, and appeals to his pride and manliness should be enforced by a careful *but unsuspected* watch upon his every movement, and by the profound sympathy to which he is entitled in his attempts to discontinue what to him is a very seductive pastime. In one of more mature years the same means will prove as effective, and, unless badly demoralized, repeated, earnest and properly timed appeals will aid in calling into play the full power of the patient's will. Every effort must be made to improve the general health and to insure the greatest possible vigor and hardiness by cultivating habits of regular and constant employment in the open air. The patient should not be left to himself, to his gloomy broodings and sore temptations, neither should he be permitted to engage to any great extent in sedentary occupations or severe intellectual efforts. He should live in the open air, eat an abundance of plain, wholesome food, avoid spices and all stimulants, and be kept at some light manual labor or appropriate physical exercise long enough to insure a natural desire for bedtime and rest, without incurring absolute fatigue. It is well to have him eat a light supper, thus avoiding overloading of the stomach, and to forbid drinking freely just before retiring, in order to prevent the accumulation of a large amount of urine in the bladder, a condition which is prone to excite a pollution. The bed should be comfortable, hard rather than luxuriously soft, and too heavy covering should not be used. The patient should rise early, and, unless contraindicated, may take a rapid and cold sponge-bath, followed by thorough friction with a coarse towel or flesh-brush. Pains should be taken, especially in the case of young boys, to make them live outside of themselves, to romp and play, and to develop to the utmost all there is manly and noble in them; to this end the influence of a judicious mother is simply invaluable. Persons of more advanced years should be made to feel that they can wholly redeem themselves by a conscientious effort to overcome their temptation, and the intelligent sympathy of a friend will render much aid in sustaining the patient; other moral influences, such as are afforded by appropriate reading, the society of pure and refined women, in fact, everything that makes man better, and fills him with the desire for a useful and honorable career, will prove of the greatest help. In due time, marriage may become advisable. It is well known that marriage, at the proper time, is not only allowable, but in every way desirable; it brings into play factors that have a powerful influence for good, and by the ready and legitimate gratification of sexual desire removes usually the most potent cause of mischief. Indulgence in promiscuous and illegitimate sexual intercourse is, however, not only of questionable propriety, even in exceptionally trying cases, but also of questionable usefulness. The moral effect of close association with depraved women and the danger of contracting syphilis in some form are in themselves very excellent reasons why no medical man should ever urge or permit such a course; and it must not be forgotten that the chief curative factor as it exists in the marriage relation lies in the continuous gratification of the sexual appetite, a relief which cannot be obtained by occasional visits to a house of prostitution.

At times, in attempting to break up the habit of self-abuse, the employment of mechanical devices becomes advisable; a ring of rubber or leather, armed with blunt metallic teeth, is frequently of advantage, by its pressure awaking the patient when an erection is taking place. Cold sitz-baths and cold ablutions are also of service, but should be used moderately, and in the early part of the day.

When spermatorrhœa depends upon a narrow and elongated prepuce or upon phimosis, surgical means must be employed at once to remove the cause; other local affections enumerated as ætiological factors must be treated as circumstances demand.

Therapeutics.—The treatment of this affection by the physiological schools of medicine is tonic and sedative, the rationale of the treatment being apparent. The list of remedies likely to be of use, or possibly indicated, under the homœopathic law is perplexingly full, owing to the large range or variety of symptoms in the nervous and in the reproductive systems produced upon provers by so many drugs; there is hardly a proving extant but that would justify, from its symptomatology, in its primary or secondary effects, thoughts of the possible applicability of the respective drug to the treatment of spermatorrhœa. The promptness with which remedies are often reported to have acted in the treatment of this disorder is, however, greatly exaggerated, and the young practitioner must not allow himself to believe in cures of well-established cases of spermatorrhœa made in a few days, or weeks at best. Such reports deserve no credit whatever, and an experienced physician will not hesitate to pronounce them point-blank falsehoods or inexcusable blunders in diagnosis. Patience and time are most important elements in the treatment of these cases, and the true remedy must usually be exhibited continuously for a long time before permanent improvement and a cure can be established.

In the writer's experience the following remedies have proved most frequently useful and reliable: Gelsemium, Phosphoric acid, Phosphorus, Digitalis, Nux vomica, Aurum met., Calcarea carb., Cannabis indica.

Special Indications.—Gelsemium.—Of especial service when there exists a general, and sometimes fairly overwhelming, relaxation and depression of the whole system. The patient has a shambling, dragging gait, the countenance bears a stupid expression, and is sallow or of a peculiar venous blue. The genitals are cold and relaxed, and very weak and irritable; ejaculations of seminal fluid take place without pleasurable sensation, and there is often a copious and continuous discharge of prostatic juice. Attempted intercourse is unsuccessful; the patient feels that it will prove unsuccessful, hesitates a long time before making the approach, and is likely to have an emission, without active erection, from the slightest caress or as soon as actual introduction of the organ is attempted, usually a hopeless task from the flaccidity of the organ. Discharge of seminal fluid while at stool. In some cases there is copious and warm sweat about the scrotum.

The mental condition of the Gelsemium-patient is usually well marked, being depressed, feeble in activity, despondent, yet, if not careless as to results, wholly lacking the extremity of despair and readiness to cut it short by some desperate means which characterizes, for instance, the Aurum-patient; there is also present, at times, a species of low, nervous restlessness, and frequent discharge of large amounts of watery, limpid urine. The remedy is also recommended after suppressed gonorrhœa, with soreness and dragging pain in the testicles.

Phosphoric acid.—This remedy is of the greatest usefulness in young persons who have been guilty of excessive masturbation or immoderate gratification. The patient shows the common and marked general depression of the system found in these cases, and a very great weakness of the genitalia. There is either no sexual desire at all, the seminal fluid in the meantime escaping freely because there does not seem to be sufficient structural integrity to hold the fluid, or the slightest touch of the genitals, any trifling provocation, brings on an erection, which takes place quickly, almost in an instant; it has proved characteristic of this remedy, in the writer's experience, that the erection is but the effort of an instant; the organ relaxes as quickly, an unsatisfactory emission taking place with the same suddenness, followed by chagrin, disgust, weakness; this symptom is experienced when masturbating as well as during an attempt at an embrace. Sudden relaxation of the penis, preventing emission, is also a reliable indication. The dilute acid should be used in light doses, repeated at regular intervals.

Phosphorus.—This remedy is well indicated when the nervous and the reproductive systems are in a state of erethism, the patient being perfectly unstrung. His fancies and lascivious, foul imaginings drive the patient to the verge of insanity; he abandons himself to them after finding out that they have mastered him; he has voluptuous tickling along the urethra, provoking a violent erection and emission, which seem only to feed the flame, and lead him to again bring on an orgasm by any means within his power. Gradually he indulges in the wildest antics, strips himself, and luxuriates in contemplating the most unnatural and beastly means of gratifying his mania. In due time the permanent depression naturally follows, with its characteristics; but even then the peculiar, morbid excitability of the sexual organs and the coloring of his fancies remain remarkably pronounced. In the wildness of the sexual passion, Phosphorus in men, clinically, is what Platina is in women. The stereotyped indication: useful in tall, lean youths, may be remembered.

Digitalis.—The affection is the result of excessive masturbation or sexual indulgence. Frequent emissions at night, accompanied with lascivious dreams, followed by pain in the penis, and often a sensation as if something were running up the penis; emissions, at any time, are accompanied with pain in the penis. General debility, loss of appetite, of tone and digestive power of the stomach, palpitation of the heart, and violent action of the heart upon slight exertion; præcordial distress, tightness and oppression of the chest, faintness, ringing in the ears. Dread of the future; aversion to all occupation; at times faintness, even to syncope.

Nux vomica.—Nux is of service in that earlier stage in which the sexual apparatus is seriously affected, the patient as yet not suffering severely from systemic disorders. He looks and acts well, save the tendency to moodiness and aversion to continued exertion which foreshadow approaching general derangement. There are frequent emissions, with lascivious dreams, especially in the early morning and after eating a late hearty meal; there is weakness of the lower extremities, and we find the [illegible], characteristic aggravations, tendency to gastric derangements and constipation, headache, etc., which belong to Nux. The remedy is frequently indicated in persons who experience an almost irresistible desire to masturbate, and who are much troubled with priapism.

Aurum.—Gold is a remedy not so often indicated as might be inferred from its symptomatology. When clearly indicated, it acts promptly. Its well-known mental symptoms, the utter dejection and unyielding, unreasonable melancholy, with a spasmodic desire to end the farce by violence, are not generally found with sufficient distinctness to justify basing upon them chiefly the selection of the remedy, for all the remedies of real value in the treatment of spermatorrhœa possess very similar mental symptoms. Aurum seems most suitable to fair-haired boys at, or some years beyond, the period of puberty, of a well-pronounced scrofulous diathesis and highly organized nervous system, who have been excessive masturbators from early boyhood, and are suffering severely from the effects of the vice upon their nervous system; such persons are sensitive, brood over their affliction, dread the future, have high aspirations, but lack the moral courage and the firmness of will to conquer the morbid appetite for sexual indulgence. It is in these young men who are at one moment reaching forward with intense earnestness for a life of usefulness and distinction, and during the next moment not only realize keenly their moral and physical weakness, but overestimate the helplessness of their position, and believe themselves doomed to an ignoble fate, and the mind at first becomes singularly fitful in its action, swaying from one extreme to another, from joy to despair, from seriousness of thought to frivolity, from determination to accomplish to the pitiable whine of the moral coward, until the desire for self-destruction asserts itself strongly. The Phosphorus-patient [illegible] up with [illegible] lives in a state of constant erethism; with Phosphorus and Aurum [illegible] tinuous "fagging-out," but of the last two, Aurum [illegible] the more [illegible] and more sensitive organization, impressing far [illegible] ally that [illegible] d the higher and nobler planes of moral and in[illegible]

[illegible]ca c[illegible] [illegible] Kafka and a number of other German writers [illegible] at efficacy in the cases of scrofulous persons who [illegible] ects. The choice of the remedy depends very largely [illegible] nts which are characteristic of it, particularly the tendency to a cold, clammy perspiration of the hands, feet and, sometimes, of the head. After the occurrence of the pollution the patient suffers from pressing pain in the back and head, and between the shoulder-blades, and complains of general weakness and trembling, particularly in the legs.

Remedies less frequently indicated, and of less clinical value than those given, but still very useful, are: Mercurius, China, Sarsaparilla, Ferrum, Cannabis ind., Staphisagria, Zincum oxyd., Cuprum.

Mercurius is characterized especially by a marked sensitiveness to cold, constant chilliness, moisture of the tongue, with great thirst, burning pain in the back, and an unhealthy, greasy look of the skin, and the appearance of pimples on the face. The emissions may take place without erection or pleasure, or the erections are painful, followed by bloody emissions and great prostration, with icy-cold hands.

China comes into play when spermatorrhœa occurs in the course of a debilitating disease.

Sarsaparilla, a favorite remedy with some practitioners, has "nocturnal emissions, with lascivious dreams, followed by pain from the small of the back down along the spermatic cords, in the morning, with general prostration; or, great anguish of mind; inability to apply himself to mental work; smoky mist before the eyes when reading in the evening; prostration; soft, flabby muscles. The least excitement causes ejaculation of the fluid without sexual feeling. Offensive odor about the genitals; herpes on the prepuce; gonorrhœa checked by cold, wet weather, or by mercury, followed by rheumatism." (Raue and J. B. Hunt.)

Ferrum is presumably useful in anæmic subjects, if symptomatically indicated.

Cannabis ind., as well as **Cannabis sat.,** has increased sexual desire. In the former, lascivious, amorous thoughts rarely occur, although erections are almost constant, and often painful; in the latter there is considerable irritation in the urethra, with painful stitches, swelling of the penis, and occasional feeling of heaviness and weight in the testicles, particularly when standing.

Staphisagria has long-continued erections with lascivious dreams, followed by weakness, especially in the arms; weariness and despondency.

Zincum oxyd. is indicated chiefly by its characteristic brain-symptoms, nervous exhaustion, brooding over the consequences, etc., and characteristic headache.

Cuprum.—The writer has verified in a marked case the following, under the circumstances rather odd, symptom given by Raue: cramps in the calves of the legs and feet on trying to have connection with a woman.

Consult also: Agaricus, Agnus castus, Conium, Eryngium aquat., Lachesis, Helonias, Picric acid, Thuja, Graphites, Lycopodium, Silicea, Cantharides, Belladonna, Causticum, Ledum, Sepia, Bufo, Selenium, Lilium tigr., and others.

Auxiliary Treatment.—In connection with the hygienic measures already described, and with the administration of the carefully selected remedy, the use of electricity is not only to be commended, but in many cases proves by far the most valuable means at our disposal. In cases where systemic exhaustion seems the principal and most troublesome symptom, general faradization by means of a mild current is of incalculable benefit. It is best not to entrust the use of this powerful agent to unskilled hands, and the writer would strenuously urge the physician to administer this treatment with his own hands, at regular intervals, and with considerable caution, for he has seen much harm result from the impression that the usefulness of the current depends chiefly upon the intensity in which it is given. If general faradization ceases to act beneficially, central galvanization and local faradization should be tried.

Internal galvanization, at a point near the orifices of the ejaculatory ducts, by means of the catheter electrode, may be employed when the general health is perfect, but premature and scanty emissions occur, under the circumstances pointing to purely local trouble. The current should be *very* light, and given not oftener than once in a week or ten days.

Cauterization of the same structure, by means of the solid stick of nitrate of silver, as practiced by Lallemand, has become almost obsolete, and is justifiable only under conditions which interest the specialist rather than the general practitioner.

IMPOTENCY.

BY H. R. ARNDT, M.D.

French, Impuissance; German, Impotenz.

Definition.—Inability to perform sexual intercourse, caused by incompleteness of erection or by utter inability to produce an erection.

Causes and Treatment.—It is evident that persons who are afflicted with congenital malformation of the sexual apparatus are incapacitated for the performance of sexual intercourse; tumors in the substance of the penis, insufficient length or excessive thickness of the organ, congenital absence of the penis, are the most common forms of malformation; in rare instances excessive obesity becomes a hindrance to approach, even if the organ possesses absolutely normal proportions. Successful treatment of these cases is practically out of the question.

Moral causes very frequently give rise to a temporary, but, in the nature of things, very annoying impotency. Intense mental application, excessive worry, long-continued anxiety, not only lessen the desire for sexual gratification, but, by their depressing effect and by the lowering of vitality which they cause, lead to a temporary inability to perform the act; the treatment of such cases obviously lies in the removal of the cause and in rest. At times, a similar effect in married men is produced by dislike of their companions; not unfrequently a man shows normal desire and normal vigor to embrace one woman, while the desire and the ability, or the latter only, disappear when approaching sexually some other person of the opposite sex. If this personal dislike exists in the married relation, moral agencies alone, as the awakening of a genuine affection for the disliked wife, avail anything; if due to some caprice, to embarrassment or apprehension, as is at times felt by men previously of bad habits when entering the marriage-bed, time and perseverance are almost always sufficient to cure the affection. A want of confidence, a positive dread of attempting the performance of the act, based upon the belief that failure is sure to result, is, in young married men, one of the most common causes of temporary impotency, and is frequently brought to the notice of the physician. Here, also, our main reliance is to be placed upon the exercise of common sense rather than upon the action of remedies. The cause of the trouble should be fully and clearly explained to the patient, and he must be made to understand and to believe that eventually everything will come out all right. If perfectly well, no direct treatment is needed; if suffering from any slight derangement in any part of the system, it is well to remove it; the mere consciousness that something is being done often proves a source of great comfort to the apprehensive patient.

It often is good policy to advise discontinuance of all attempts at sexual intercourse, without, however, depriving the patient of the ready means of gratification. In the vast majority of cases the customary caressing and fondling between young married people will lead to a state of sexual excitement which makes the patient forget both the advice of the physician and his own fears, and results in the normal performance of the act; this once accomplished, the trouble is at an end. It has been, and with some is now, customary to administer aphrodisiacs, as cantharides or phosphorus, a short time before intercourse is likely to be attempted, with the view of determining a free afflux of blood to the parts, and to temporarily "bridge-over" the emergency. This practice is open to serious objections, and is only excusable in exceedingly rare cases, if at all.

Impotency may be nothing more than an expression of general debility, and as such occurs in the course of a number of diseases, as in the serious affections of the kidney, in chronic gastric affections, notably dyspepsia, and in others of the same class. In such cases the permanent cure of the disturbance in the sexual apparatus can only be had by the cure of the disease which is the causative factor. Practically the same result is obtained by excessive indulgence, particularly by the young, and more especially in the shape of masturbation, leading to conditions described in the preceding article on "spermatorrhœa;" to benefit cases of this class, the various means fully described under that heading must be employed.

The period of life when the sexual instinct naturally lessens, usually at the approach of the fiftieth year, in persons of naturally feeble desire or who in early life have been guilty of excesses and irregularities, is anticipated, while in others it is postponed for a varying length of time; in the absence of other causes this depends upon peculiarities of constitution which are of interest only as a matter of speculation. Whenever this time of natural decline comes, be it early or late in life —and extremes are found—there is a perceptible relaxation of the sexual organs, a shrivelling of the parts, a flabby state of the scrotum and diminution of the testicles both in size and firmness, and a feeling of coldness, which go hand in hand with the decrease in desire, and terminate in a normal impotency without producing the slightest sytemic disturbance. Although men usually dread this physiological loss of sexual power, and often resort to various and frequently amusing means to put off this state of sexual decline, little can be done toward that end save a careful husbanding of strength by faithful compliance with natural laws.

Impotency may be the result of a destruction of the function or integrity of the testes; violent emotions, acting upon the testicle through the brain, may arrest for a time the desire and the ability to perform the sexual act, and more serious affections of the brain, a violent concussion, or an apoplexy, may permanently, and in the same manner, cause impotency which is practically beyond the reach of medical aid. Curling (*Quain's Dictionary*), speaking on this subject, calls attention to the fact that diseases and injuries of the spinal cord do not affect the integrity of the testicles, but destroy the power to copulate.

Impotency and sterility in the male are not unfrequently placed in the same category. It is quite evident that the confirmed victim of impotency must be sterile also; but his sterility depends wholly upon the inability to perform the act of copulation and to deposit properly the seminal fluid of which he may possess a sufficient amount to beget offspring. True sterility, however, depends upon a condition in which no semen is secreted (as in persons in whom the testicles are missing, or in those rare cases in which the testes are utterly destroyed by pathological processes) or in which existing strictures, wounds, or malformations divert the secreted semen into wrong channels, not preventing the possibility of copulation, but rendering the act fruitless, so far as propagation of the species is concerned.

The treatment detailed in the chapter on "spermatorrhœa" should be carefully studied in connection with this subject.

BALANITIS.

BY H. R. ARNDT, M.D.

Balanitis, blennorrhagia balani, bastard clap, an inflammation of the opposing surfaces of the glans penis and of the prepuce, occurs more frequently in persons who have an elongated, slender prepuce, and in most cases is the result of local irritation by warts, accumulated smegma, pus from gonorrhœa, irritation from venereal excesses, etc. In many cases it may be traced directly to a lack of cleanliness, although some persons seem predisposed to the affection, and in these cases, regardless of scrupulous care of the parts, any considerable friction against the lining of the pantaloons in walking or riding may bring on an attack of balanitis. The writer has seen at least two cases of married men in whom attacks of balanitis were brought on repeatedly by intercourse with their wives who were suffering much from an irritating leucorrhœa; the leucorrhœa, in one case, disappearing, intercourse was had freely without harm; upon the return of the irritating discharge the husband, within a short time, suffered as formerly. The affection is not very common; yet cases occur in the practice of most physicians, and from the anatomical location of the seat of the difficulty give rise to much annoyance and pain.

Symptoms.—The affection begins with a severe itching, heat, and redness of the parts, soon followed by the secretion of a thin, yellowish substance, of somewhat characteristic odor; the heat and swelling of the parts continuing, superficial and irregular excoriations occur, sometimes resembling and feeling like a long, fine crack in the skin, exquisitely sensitive, and excessively painful when touched or when irritated by the passing urine; some headache and slight feverishness are often experienced at this stage, and the secretion of the now more deeply colored, often greenish, thick, and quite offensive matter is copious. Resolution not taking place, the preputial swelling assumes remarkable proportions; the foreskin becomes creased at its free border, there is throbbing, heavy pain, and the feeling of general indisposition is well pronounced, a voluptuous itching of the parts adding greatly to the annoyance suffered by the patient. The prepuce at this stage cannot usually be turned back, and an attempt to do so may result in paraphimosis, necessitating prompt surgical interference.

In exceptional cases suppuration of the cellular tissues results, with sloughing of a greater share of the foreskin, at times, indeed, involving the entire prepuce, leaving only the frænum, the penis afterward presenting the appearance of being circumcised. Firm adhesions of the prepuce to the glans penis may result, and thickening, with subsequent phimosis, has been recorded.

The disease may be arrested within a very few days if properly managed, and the writer has known resolution to take place under perfect rest and frequent bathing only, even when well advanced; in exceptional cases, particularly in persons of strongly marked scrofulous habit or of a suspicious history, the course may be tedious beyond expectation.

Diagnosis.—Inexperienced persons may be led to mistake balanitis for gonorrhœa and chancre, and much uneasiness of mind may be caused by a faulty diagnosis. In gonorrhœa the discharge may be seen to issue from the urethra; chancre, whether simple or syphilitic, can be determined by the undermined edges and spongy surface of the one, and the indurated base and the lymphatic enlargement of the other; if under the prepuce, it is usually not difficult to recognize the chancre by the hardness and limited extent and well-defined circumference of the sore, to which, after a few days, will be added the appearance of other sores. The entire absence of general congestion, the lack of excessive sensitiveness, and the "grouping" of herpetic eruptions clearly establish the differentiation between herpes and balanitis.

Treatment.—In the early stage, and in mild cases, perfect rest and absolute cleanliness of the parts, secured by turning back the foreskin and carefully bathing the exposed inner preputial surface with tepid water, to which may be added some astringent or a few drops of hydrastis, are nearly always sufficient to establish a prompt recovery. If the case is of a more serious type, or further advanced, particular pains are to be taken to keep separate the opposing surfaces, and with the aid of a long-nozzled syringe medicated tepid injections should be freely thrown to the farthest part of the foreskin. Excoriations should be treated with a 6 to 10 grain solution of Nitrate of silver, carefully bathing and drying the parts before the application is made, and dressing with fine, dry lint or cotton before the prepuce is drawn forward. With the exercise of due care, complications requiring the use of the knife are not likely to arise; if they do, full directions must be sought in works on minor surgery.

The writer has had excellent results, even in quite severe cases, from a careful rolling back of the foreskin, followed by the free use of tepid water and the liberal application of pure glycerine or of a glycerole of hydrastis; the treatment is somewhat painful at first, but if repeated several times a day, has always proved efficacious.

Aconite, Belladonna, Gelsemium, Thuja, Mercurius sol., Mezereum, and others, may be exhibited if indicated by local and constitutional symptoms.

URETHRITIS.

BY H. R. ARNDT, M.D.

Under this head reference is had only to a non-specific inflammation of the urethra. It is of uncommon occurrence, and, in a majority of cases, is due to traumatism, more frequently to injuries received during the passage of instruments and of calculi. The symptoms are soreness and pain in the urethra, swelling, scalding and painful urination, and discharge, possibly mixed with blood; these symptoms develop soon after the receipt of the injury, and are not difficult of management unless the injury done proves very extensive. Arnica, Aconite, Belladonna, Cantharides, and other remedies suggested by the totality of symptoms, are applicable to these cases.

A much more violent form of urethritis occurs in connection with gout. The local symptoms are very intense. "In gouty urethritis the inflammation may be as severe as in well-marked gonorrhœa, and accompanied by the complications of the testes, bladder, eye or joints, which are met with in cases of gonorrhœa. The leading distinctions of gouty urethritis are the milkiness of the discharge, the absence or small amount of swelling of the forepart of the urethra, though the scalding in the perinæum and irritability of the bladder are severe" (Berkely Hill in *Quain's Dictionary of Medicine*). The existence of this form of urethritis is, however, called into question by so eminent an authority as J. M. Charcot, who, in his *Clinical Lectures on the Diseases of Old Age*, refers to this subject as follows: "A gouty urethritis, with escape of pus from the urethra, has finally been mentioned; but have not the writers (Scûdamore in particular) allowed themselves to be imposed upon? Perhaps it was a case of blennorrhagic arthritis—such, at least, is the interpretation which may be given to some of Scudamore's observations."

Berkeley Hill also describes a tubercular urethritis which "is always a very indolent affection, being due to the slow degeneration and ulceration of tubercular deposits in the deeper portion of the canal. In such cases, the irritability and inflammation of the bladder are always more urgent than the urethritis, while the evidence of tubercular disease in other parts of the body is usually sufficient for diagnosis" (*Quain's Dictionary*, article on "Diseases of the Urethra").

GONORRHŒA.

BY W. B. TRITES, M.D.

Synonyms.—Blennorrhœa, Urethritis.

Definition.—Gonorrhœa is a contagious, inflammatory affection of the mucous membranes, arising usually from impure sexual intercourse, attacking the mucous lining of the urethra in the male, and developing upon the surfaces of the vagina, vulva, and urethra in the female.

History.—The early history of gonorrhœa is of value to the antiquarian alone, but the confounding of the disease with syphilis, which occurred in the latter part of the fifteenth century, has a special value to homœopathists, as it influenced the treatment adopted by our school.

In consequence of this error, the treatment of gonorrhœa grew to be identical with that of syphilis, and, as syphilis was known to be a constitutional disease, it was argued that gonorrhœa partook of the same nature. This view, though born of the crude medical philosophy of the middle ages, continued to be the received pathology of the dis-

[illegible] date. Astruc, as early as 1740, [illegible] while Balfour in 17[illegible], and Bell, in 1792, taught that [illegible] are distinct diseases. The truth, thus [illegible] have been accepted, had not John Hunter [illegible] Hunter, at this time in the very flower of his [illegible] his work on venereal diseases, in which he [illegible] numerous experiments therein [illegible] was real. Owing to Hunter's [illegible] the sound teaching of Balfour and Bell [illegible] thus bolstered up, remained [illegible] until R[illegible] experiment, in 1837 proved [illegible] that the diseases are not identical.

[illegible] a time when the medical [illegible] an eminent a leader as Hunter, [illegible] of one and the same virus, the [illegible] surface upon which it was [illegible] membrane, gonorrhœa was the result [illegible] chancre was produced. Hahnemann, [illegible] treated gonorrhœa as a constitutional disease, [illegible] into homœopathic therapeutics [illegible] our profession who adhere to this belief. [illegible] all local applications, lest their use might [illegible] constitutional symptoms of the disorder, and [illegible] harmless gonorrhœa [illegible] the spectres of the past [illegible] should be forgotten: and [illegible] or not, we should remember [illegible] the shadow of a doubt that [illegible] has no relation whatever to syphilis.

Ætiology. [illegible] as to the causes from [illegible] teaching that it is always [illegible] other, denying this [illegible] holds firmly to the [illegible] virus, and affirms [illegible] acquires it from a diseased [illegible] whereby a gonorrhœa [illegible] leucorrhœa.

[illegible] names in venereal [illegible] Martin, Rollet, and [illegible] exists a distinct virus. Among the English [illegible] exists. Thompson, Berkeley Hill, [illegible] and Hutchinson believe in the multiple origin of clap, while [illegible] Cooper, and others, equally eminent, claim that a specific [illegible] exclusive source of the disease. In America, we find Van Buren, Keyes, Durkee, and Helmuth believing in the existence of a virus from which the disease springs, while Bumstead, Otis, Gouley, and Sturgis deny its specific character. What shall we conclude from such conflicting testimony? Is the disease the result of a virus, or is it not? The importance of these questions will be apparent when we consider how much may depend upon their determination. The virtue of a wife or daughter, the happiness and good name of a household may hang upon the answer; hence it behooves us to weigh the testimony with conscientious fairness, and give the verdict only after the most searching inquiry.

Let us glance at the arguments advanced by the opposing sides in this discussion.

Those who believe in the existence of a specific virus assert that gonorrhœa can alone produce gonorrhœa. They deny that it can originate *de novo*, and believe that it is always caused by the deposit of a peculiar virus upon a mucous surface; they deny the assertion of the non-virulist that pus from a non-gonorrhœal source will produce a contagious urethritis.

The non-virulist, on the other hand, admits that gonorrhœa is contagious, but denies that its action is so definite and certain as has been pretended. They hold that the determining cause of the disease which we call gonorrhœa, but which they prefer to call urethritis, is irritation, and that the contagious quality of the pus of gonorrhœa is due not to a virus, but to the fact that it is an active irritant. Again, they teach that any irritation of the urethral mucous membrane can, and does, provoke an inflammation as persistent and as contagious as though it had had its birth in an absolute virus. Hence, as causes of the disease, they enumerate:

First. Irritation of the urethra from various vaginal discharges, such as leucorrhœa, the menstrual flow, secretions from ulcerations of the os uteri, malignant and other diseases of the womb, chemical irritation, such as strong injections, etc.

Second. Traumatic causes, such as catheterism, passage of calculi, masturbation, etc.

Third. Adjuvant and predisposing causes, such as errors in diet, excesses in drink, muscular fatigue, over-indulgence in sexual pleasures, prolonged erotic thoughts, stricture; individual predisposition, as scrofulosis, gout, and the rheumatic diathesis; the use of certain drugs, as cantharides, and the use of certain articles of food, as asparagus.

They further assert that pus, if it is injected into the urethra, will produce a contagious urethritis not distinguishable from gonorrhœa. In defence of this assertion they refer to the experiments of Vetch, who injected pus derived from cases of Egyptian ophthalmia, and produced urethritis in thirty-six hours; the case reported by Guyomar, who injected pus from granular purulent ophthalmia into his own urethra, and caused a gonorrhœa in three days which lasted for three weeks. They refer also to the investigations of De Landau and of Hillier, who produced in themselves urethritis, the one by injecting pus from a case of ophthalmia neonatorum, the other by the use of a mechanical irritant, and then communicated the diseases thus produced to their wives.

These experiments are not questioned by the believers in a specific virus. They admit that pus, under certain conditions, has the power of producing an inflammation of the mucous surface of the urethra, but they deny that the inflammation thus produced is gonorrhœa. The whole question, then, seems to turn upon the existence or non-existence of diagnostic differences between simple urethritis and gonorrhœa.

The non-virulists maintain that these differences do not exist, and that if their opponents admit the credibility of the experiments quoted, then a contagious urethritis has been produced *de novo*, by non-virulent materials, and the need of a specific virus to account for the existence of gonorrhœa no longer exists.

The virulist combats this entire theory, and defines gonorrhœa as a contagious disease, producing a pus which is not merely an irritant but a contagious material, and which, if brought in contact with certain mucous surfaces, will invariably produce gonorrhœa. The conditions of drunkenness, erotic excitement, errors of diet, muscular fatigue, which play such important parts in the ætiology of the non-virulist, have no place here, although they are admitted to be of importance in causing simple urethritis.

Milton asserts that many of the supposed causes of the disease, which we have enumerated under the head of adjuvant and predisposing causes, rest upon the unsupported statements of single individuals, and that other observers, with the widest experience, have failed to discover similar instances. That the use of instruments may produce an inflammation of the urethra is admitted, but that the discharge from such an inflammation is either prolonged or contagious will, we think, be denied by the great majority of surgeons. That pus will produce irritation of the urethra may be true, but that it always, or even frequently, acts thus, we think, cannot be proven. We have frequently treated purulent cystitis, balanitis with phimosis, where the anterior portion of the urethra must have been bathed in pus, but in not a single instance have we had anything which even simulated gonorrhœa.

Leucorrhœa and other morbid discharges of the genital organs are thought to be fruitful causes of urethritis by non-virulists. The question naturally arises, if these muco-purulent affections are able to excite such a painful and persistent trouble as clap, how is it that the disease is not more common? Nine-tenths of the married women of

America either have, or else some time during their wedded lives have had, a vaginal discharge of some kind, yet we have known of but few cases of gonorrhœa in which such a cause was even suggested, and when suggested, careful examination has usually shown that one or the other of the married pair was living in violation of the marriage vow.

Ricord, seeing this difficulty, has advanced the theory of acclimation, in which he teaches that the frequent exposure of the penis to the peculiar discharge of the wife's vagina causes it to become insensible to the irritant, and thus it escapes disease. Certainly a poor defence; for there must have been a time when the penis was not insensible, during the early days of wedlock, for instance. If the theory of Ricord is true, we should have many cases of urethritis among the newly married, for here still another of his inducing causes exists, *i.e.*, sexual excess. He believes that sexual excess will cause an otherwise bland discharge to take on an irritant quality and thus produce disease. We cannot remember a single case of clap occurring in those newly wed, and we believe that our experience is not exceptional, and that this is due to the constancy of those who have but recently entered into the married state.

To our mind the arguments advanced by the believers in a specific virus as the cause of gonorrhœa appeal most strongly; hence we prefer to look upon the disease as due to the action of a *specific* virus; still, we should remember that the evidence upon the other side is voluminous, and in cases of uncertainty, where the reputation of the parties is at stake, we should give them the benefit of the doubt.

Pathology and Anatomical Changes.—Gonorrhœa is an active inflammation of the urethral mucous membrane in the male, and of the vulva, vagina, and urethra in the female. The action of the virus seems to be limited to these parts, though at one time it was considered possible to have the inflammation occur in the nose, mouth, anus, and umbilicus, but more careful observation has proved the latter teaching erroneous. If the pus is deposited upon the conjunctiva, a violent ophthalmia results, which may rapidly destroy vision.

The inflammatory action is exactly similar to that occurring from other causes, and is attended with heat, redness, swelling, pain, and a profuse discharge. In the early stage only about an inch of the urethra is affected, the fossa navicularis being especially involved. The inflammation rapidly spreads along the canal, frequently reaching the bulbous portion of the urethra, and sometimes the seminal ducts, the base of the bladder, and in some rare cases the ureters, and even the kidneys themselves.

If we examine with the endoscope a recent case of gonorrhœa, we find the mucous membrane, as far as the fossa navicularis, red and congested. As the inflammation advances in severity, and involves deeper portions of the tube, we find shallow ulcerations of the mucous membrane occurring, surrounded by deeply congested patches, and bathed with a profuse secretion. Later, the inflammation subsides and the ulcerations heal, except at certain points, notably the bulb and the fossa navicularis; here chronic inflammatory symptoms develop and involve the sub-mucous tissues in the ulcerative process; hence, the frequent development of strictures at these points.

Symptomatology.—A typical case of gonorrhœa may be divided into three distinct and well-marked stages: a stage of incubation; a stage of inflammation; a stage of decline.

The Stage of Incubation.—The duration of this stage is variable; it may continue only for a day, or it may be prolonged for a week, and even ten days. The interval between exposure and the development of symptoms is short in those who have had the disease before, and longer in those who contract it for the first time; in such persons four to five days is the ordinary interval. At the expiration of this time the patient will notice a tickling sensation about the meatus. The symptom is not unpleasant, and may give rise to voluptuous, erotic thoughts, which may culminate in sexual intercourse. If the penis be now examined, the mucous surfaces of the meatus will be found to pout more than in health and to show a rosy pink color, and the lips are agglutinated by a scanty, colorless, viscid secretion. These symptoms are not attended with discomfort, and often pass unnoticed by the patient. This stage continues from one to three days, and is followed by the stage of inflammation.

The Stage of Inflammation.—The second stage of clap is marked by two prominent symptoms: burning on micturition, and a free discharge of pus from the urethra. During the first stage the discharge was colorless and scanty; in this stage we find it profuse, pouring from the urethra in a stream, of a cream-yellow color, presenting all the appearances of laudable pus. Sometimes it is of a greenish color, owing to the admixture of blood from the congested mucous membrane. The most characteristic symptom of this stage is the *burning sensation felt in the urethra when urinating.* In most cases it is exceedingly distressing. If we are to believe the stories of the sufferers, liquid fire forced through the canal would not cause greater agony. It is caused by the stream of urine dilating the inflamed urethra, and also by the urine, loaded, as it is, with irritating salts, being brought in contact with the sensitive walls of the tube. *Painful erections, especially at night,* also appear during this stage. These are extremely annoying, and are due to the highly sensitive condition of the penis, caused by congestion, which makes it susceptible to the least irritation, such as contact with the bed-clothing or even the warmth of the bed. The presence of a small quantity of urine in the bladder also causes them; hence, the patient's rest is disturbed by being obliged to urinate at frequent intervals in order to avoid having erections. Painful erections are due to *chordee*. In this condition the penis, when erect, is bent or twisted; this is caused by an unequal dilatation of one or the other of the spongy bodies composing the male organ. The penis, it will be remembered, is composed of three bodies, the corpora cavernosa and the corpus spongiosum. Through the latter the urethra runs, its upper surface or roof being bounded by the corpora cavernosa. In consequence of the urethral inflammation an exudation of plastic lymph takes place, usually into the spongy body, though it may occur into either of the cavernous structures. As a result of this, the spongy body may be felt like a cord along the under side of the penis, and forms, owing to its frequency, one of the physical signs of gonorrhœa. The blocking-up of the spongy tissues of these bodies by lymph obstructs the inward flow of blood at the time of erection, thus causing them to expand unequally, and this unequal expansion produces that characteristic bent or bowed form to the penis which has given to the symptom its name. If the spongy body is alone affected, the penis will be arched; if either of the cavernous bodies are invaded, the organ will be bent toward the affected side. Chordee is an extremely painful affection, and constitutes one of the horrors of clap. The spasms are usually of but short duration, being relieved by the passage of urine. In some cases the symptom is so persistent and troublesome as to require special treatment.

An examination of the penis during the inflammatory stage of the disease will show the glans reddened and moist, the lips of the meatus pouting and of a deep crimson color, and the whole organ swollen and painful. Beside the burning pain attending the act of micturition, the patient complains of a sensation of heat in the inflamed parts, of aching and dragging pains in the groins, testicles, and loins. When the inflammation has involved the bulbous portion of the urethra, weight and tenderness of the perinæum are often complained of.

The second stage continues from one to three weeks, its duration depending very largely upon the constitution, habits, and mode of life of the patient; also upon the number of previous attacks. First attacks yield readily to treatment, while in those who have had the disease two or three times it resists medicine and takes on a chronic form.

Stage of Decline.—The second stage is succeeded by the stage of decline. No marked symptoms differentiate it from the preceding, it being recognized by a gradual decline of the symptoms which have developed during the inflammatory stage. The burning subsides, the free discharge of pus becomes less and less profuse, and, gradually losing its yellow, thick appearance, becomes like the clear, viscid mucus which clogged the meatus in the early stage of the disease.

The painful erections may continue far into this stage, for, though the inflammatory symptoms are subsiding, the removal of the exuded lymph is a much slower process, and upon its presence the symptom depends.

The duration of the third stage is exceedingly variable, in some cases yielding readily to medication, in others resisting our best efforts and terminating in that *bête noire* of the venereal physician, gleet.

Diagnosis.—The diagnosis of gonorrhœa is not often difficult, because the symptoms it presents are so different from those attending the other venereal affections. When balanitis is complicated by a phimosis, it may require care in examination to determine whether the trouble is due to gonorrhœa or to balanitis. If, in such cases, the discharge about the meatus is carefully cleaned away and pressure made along the urethra, we can readily observe whether the discharge flows from the meatus or whether it runs down from between the mucous surfaces of the prepuce and glans; if from the former, it is gonorrhœa; if from the latter, the disease is balanitis.

A urethral chancroid may be a cause of uncertainty, but in the following table the differences, it will be seen, are marked.

URETHRAL CHANCROID.	GONORRHŒA.
Discharge slight, gluey, may be bloody.	Discharge profuse, of creamy or greenish pus.
Pain localized when urinating.	Pain burning in character, and felt along the whole extent of urethra.
Absence of general congestion and erections.	General congestion present, and erections frequent.

The urethral chancroid, if it exists, is usually developed close to the meatus, hence an ordinary ear speculum will be found of service in making the examination.

The initial lesion of syphilis, when seated within the urethra, presents some of the symptoms of gonorrhœa, and might be mistaken for it, but an examination of the following table of differences will aid us in distinguishing between them.

INITIAL LESION.	GONORRHŒA.
One hard, tender spot is noticed along the course of the urethra.	The whole urethra feels like a hardened cord, and is slightly tender.
The lymphatic glands of the groin are enlarged and painless.	The lymphatics are not likely to be enlarged, but if enlarged, they are painful.
The discharge is scanty and serous.	The discharge is profuse and purulent.

It should be remembered that in typhoid fever, in gout, and after the use of instruments, we may have a discharge from the urethra, but the history of such cases will aid us in the diagnosis.

Prognosis.—The prognosis is usually favorable. It is, however, a painful disease, and one which may be followed by a train of sequelæ difficult to cure. I would especially caution the young physician against promising too much. Patients suffering with clap are proverbially impatient. The cure must be made at once, and usually the first question after the diagnosis is made is "how long will it require to cure me?" The answer should be extremely guarded, for the slightest attacks, in spite of most careful treatment, may run into gleet and other tedious troubles. In prognosticating we are to bear in mind the following facts:

First attacks are more amenable to treatment than are second or third attacks. Inflammatory cases of the disease recover more rapidly than do the atonic forms. Cases occurring in persons of a strumous diathesis recover slowly. If the period elapsing between the intercourse and the appearance of the disease is short, the case is apt to be mild.*

A knowledge of the habits, diet, and mode of life of the patient is of importance in forming a prognosis, for they each exert a powerful influence upon the course of the disease. If the patient is dissipated, drinks or eats to excess, is careless in regard to personal cleanliness, is irregular in his habits, follows an occupation which is exposing or which calls for excessive fatigue, the disease will be prolonged, and complications will frequently occur.

Jahr thinks that when the patient has had repeated intercourse with a diseased woman, the resulting gonorrhœa is more obstinate than where the exposure has been less frequent. He says:† "I have been finally led to conclude, after the most careful observation, that the obstinacy with which the disease, even when of an apparently simple character, resists the effect of the usual remedial agents, is owing to the fact that intercourse with the infected female has been repeatedly indulged in. In cases where the disease has been transmitted by one single act of coition, I have effected a cure in from fifteen to at most twenty-one days. My experience has led me to establish an unfavorable prognosis in all cases where the act of coition had been exercised with the diseased woman in repeated succession."

"Gonorrhœa without medication," says Bumstead,‡ "will get well in from three to six months." This differs very greatly from my experience, for I am led to think that if it is persistently neglected, even though the patient take hygienic precautions and avoid stimulants, it will often continue for an indefinite period, and finally terminate in gleet. Milton § agrees with this view, and reports cases which have continued for five, six, seven, and, in two instances, twelve years; while Ricord|| relates a case where the patient suffered for more than forty years.

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* Van Buren & Keyes. A rule with numerous exceptions.

† Venereal Diseases, page 62.

‡ Venereal Diseases.

§ Milton, On Gonorrhœa, 4th edition, page 64.

|| Lettres sur la Syphilis, page 120.

Under the best treatment of the old school a cure is made in from four to six weeks. I have not been able to find in our own literature statistics showing the results of homœopathic treatment in the disease. In consequence of this failure, I addressed letters to a number of homœopathic physicians throughout the country, asking for their experience in the treatment of gonorrhœa, and especially the average duration of the cases treated. Twenty replies were received in which the duration of treatment was carefully stated, and from these I have compiled the following table:

TABLE SHOWING AVERAGE DURATION OF GONORRHŒA TREATED BY HOMŒOPATHIC METHODS.

Average	duration of treatment	from	1 to 2	weeks,	7	correspondents.
"	"	"	1 to 3	"	3	"
"	"	"	2 to 3	"	3	"
"	"	"	2	"	2	"
"	"	"	3 to 4	"	5	"

Several correspondents reported cases cured in less than one week; these were all kept in bed, and the greatest care given to the selection of diet and surroundings. My own experience would indicate a longer period of treatment than the longest given above. Many cases are cured in from two to four weeks, but equally as large a number continue for five and, in some instances, for six weeks before they can be pronounced cured. The following quotation from Yeldham* seems to fairly present the claims of homœopathy in the treatment of gonorrhœa:

"It is here that the old and new systems come into comparison. It is an interesting fact that the practitioners of the old school have arrived nearer the truth in the treatment of venereal than of any other class of diseases. All their principal remedies, in these disorders, are specifics; in other words, homœopathic remedies. Thus, Mercury is the universally admitted specific for syphilis, and is used by the practitioners of both schools; and so, also, copaiba, cubebs, and turpentine are true specifics for gonorrhœa. The great difference consists in this, that the old school, whilst they cure their patients, poison them with enormous doses of the remedies; the homœopath, on the contrary, whilst he equally cures his patient, saves him from the painful penalties of the remedy, and, in addition to this, as we shall presently see, possesses other remedies of which the allopath is ignorant, or of which, at all events, he makes no use. Herein consists our superiority. I have tested both systems in almost innumerable instances, and I admit of the one that it will cure gonorrhœa, but it will do it in a sickening way; and of the other, I assert that it will cure gonorrhœa more speedily and effectually, and without a shadow of medicinal annoyance."

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* Yeldham, Homœopathy in Venereal Diseases, 3d edition, page 10.

Milton, in his monograph, dismisses the results attained in the treatment of gonorrhœa by homœopathy in a few curt sentences, denying our success, and calling for accurate statistics upon which to base our claim of superiority. The results given above are from men who occupy the most honored positions in our school; men whose words are not to be gainsaid, and fifteen of these have, after careful investigation, stated that gonorrhœa, treated homœopathically, can, in the majority of cases, be cured within three weeks.

Treatment.—The treatment of gonorrhœa has been divided into four classes: the abortive, the hygienic, the medical, and the local treatment.

The Abortive Treatment of Gonorrhœa.—The abortive treatment was introduced by Debeney, of France; its object is indicated by its name. Quite a diversity of opinion as to its practicability seems to exist, even among those who have had an opportunity of testing it in practice. Gross is emphatic in his denunciation of the method, and ranged upon his side we find such men as Professor Lebert, of Vevay, Van Buren and Keyes, of New York, Berkley Hill and Arthur Cooper, of London; while Bumstead and Taylor insist that in properly selected cases it is possible to abort gonorrhœa. Milton, of London, advocates the practice, and Professor Helmuth of our own school says "there is no doubt about the efficacy of this treatment, if it be employed at the proper time."

I have had no experience in the use of the abortive treatment, but should a proper case present itself, would try it without hesitation. The outcry against the method seems to come, principally, from those who deny the existence of a specific gonorrhœal virus. Holding gonorrhœa to be but a urethral irritation, they cannot advocate, consistently, a remedy which must produce an irritation far more violent than the original disease. The number of cases to which the abortive treatment is applicable is necessarily limited, and its success or non-success depends upon their proper selection.

Milton* thinks it best adapted to the following classes of cases:

1. "When the patient presents himself before great pain is felt, and while the discharge is still a scanty, mucous flow."

2. Patients who have had gonorrhœa previously, in whom the present attack seems slight.

3. Those cases where the patient desires an immediate cure at all hazards.

Bumstead,† and his indications are much more satisfactory, says, "During the first few days, varying in number from one to five in different cases, before the symptoms have become acute, when the discharge is but slight and chiefly mucous, while there is yet no severe scalding in passing water, the abortive treatment may be tried."

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* On Gonorrhœa, page 139.

† Venereal Diseases, page 48.

The treatment consists in injecting into the urethra some irritating substance and depending upon the inflammatory action excited to remove the gonorrhœal virus before it has had time to develop its characteristic symptoms. The irritation thus excited soon subsides, and the patient is well.

The nitrate of silver is the irritant usually selected, and various formulæ are given for its use. If a very strong solution is employed only *one* injection is given; if a weak one, the injections must be repeated until the desired amount of irritation is produced. Helmuth uses the following:

℞.—Argenti nitratis, ... gr. x.
Aquæ destillatæ, ... ℥ j.
M. Inject once or twice, and retain for a minute or two.

Bumstead prefers a solution of from a grain to a grain and a half of the salt in an ounce of water, and injects once every 3 hours, until the effect needed is attained. This will be recognized by the discharge, which after the first injection has become copious and purulent, changing to a thin watery secretion, often tinged with blood. The following rules, abridged from Bumstead, should be observed in the use of this method.

1. The disease, when the abortive treatment is applicable, is limited to the anterior portion of the urethra, hence it is not necessary that the injection should reach the deeper parts of the canal.

2. To be successful, the whole diseased surface must receive a thorough application of the injection.

3. We must remember, if we are about to use a strong injection, that the mucous membrane of the urethra is especially sensitive to the action of the nitrate of silver, and hence watch the case carefully.

This treatment, as we have before stated, is applicable to a very small number of cases, and these are to be selected with the greatest care, for if used after the disease has had time to develop, it can only aggravate and intensify the symptoms.

Cases treated by the abortive method should be kept under careful supervision, and seen at frequent intervals for a few days after the irritating injections have been given. It will hardly be necessary to remark that injections of this kind should be used by the physician alone, and never, under any circumstances, be applied by the patient or his friends; for if the fluid should be forced far up the urethra, or if the inflammatory action excited be too intense—a result to be feared if the treatment is used too frequently or the fluid is too strong—stricture of the urethra might result and the patient's condition be very much aggravated.

The following case would seem to indicate that there may be other sources of danger in the use of the abortive treatment.

Dr. Cianciosi* reports that in September, 1880, he aborted a case of gonorrhœa by a strong astringent injection. The patient complained of malaise, intense cephalalgia and pyrexia. Auscultation showed a systolic murmur heard most distinctly at the base, respiration 28, temperature 102.2°. He diagnosed endocarditis, for which he accounted upon the theory of Klebs that a migration of micro-organisms had taken place from the urethra to the blood, and had then fixed themselves upon the serous lining of the heart.

The Hygienic Treatment.—The importance of giving careful attention to the diet and habits of patients suffering from gonorrhœa has not been sufficiently appreciated by the general practitioner. Many cases which have defied the most carefully selected remedy have rapidly improved when the vicious surroundings have been corrected and a properly selected diet ordered. In the correspondence referred to on a previous page, several cases of gonorrhœa were reported by different individuals, cured in from four to eight days. In every such instance the reporter remarked that the patient partook of a carefully selected diet and remained in bed. This experience is striking, and suggests the thought that if patients suffering with this disease would submit to rigorous rules governing their diet and movements, the four to six weeks now required for their cure might be very greatly reduced. Care, however, must be taken not to be too rigid, lest the patient, becoming restive under our restrictions, should break through all our rules and rush into excess. The more simple and easy our directions, the more readily will they be obeyed.

Diet.—During the inflammatory stage of clap, and the majority of cases present themselves during this stage, the authorities agree in recommending a light, easily digested, nutritious diet. The patient should abstain from pork, beef, salted meat, fried, greasy, and highly seasoned articles of food, acid fruits, spirits, beer, wine, and all kinds of effervescing drinks. Coffee has also been thought to aggravate the symptoms, and cheese, for the same reason, is to be avoided. Bumstead thinks that the use of tobacco, either smoked or chewed, prolongs the disease; hence it will be well to put that article also under the ban. Fish, milk, eggs, and all sorts of vegetables may be used freely. This diet need be continued only during the active or inflammatory stage of the disease; as soon as the pain on passing urine diminishes and the local inflammation subsides, a more generous bill of fare may be allowed. But during all stages, and even in gleet, the restrictions concerning the use of alcoholic and effervescing drinks, salted meats, and cheese should be enforced. Violations of this rule have in many instances transformed a nearly cured mucous flow into a copious purulent, inflammatory discharge.

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* Medical News (Phila.), February, 1881.

We should remember that the natural tendency of gonorrhœa is to lower the tone of the patient's health; hence, if we find that, in spite of careful diet, the case tends to assume a chronic form, and if evidences of enervation are detected, we should at once give up a low diet and order the most nutritious and strength-giving articles of food. This enervation may not be attended with loss of flesh, pallor, and the other symptoms which are its usual accompaniments; but the patients may appear well nourished, their color may be florid, and they may present every outward appearance of health; but a careful examination will show that health has been impaired, the appetite will be fitful, the sleep disturbed, and the customary amount of physical exercise will be found to unduly tire. In such cases we may even resort to stimulation, using sparingly claret and water, or some other light wine.

Habits.—The habits of patients must be carefully studied and corrected if found harmful. Personal cleanliness must be rigorously insisted upon, and the genitals should be frequently washed to remove the discharge as it collects. If the patient suffers much from scalding, considerable relief will be afforded by a bath in water from 98° to 100° F. From three to five minutes is sufficiently long for him to remain in the tub, and if the weather is cold it should be taken just before going to bed. This will relieve not only the scalding, but, by keeping the skin in good condition, will aid in the recovery of the patient. The amount of exercise had should be limited. During the acute stage it is best for the patient to remain quietly in bed; but it is uncommon to find persons willing to submit to such confinement, even when we can promise them a more speedy cure.

Horseback-riding, long walks, standing, either in the street or at the desk, dancing, and all exercise which keeps the patient on his feet, or causes fatigue, must be forbidden. If he "must go to the store or office," insist that the erect position shall be avoided as much as possible and that a proper suspensory bandage be worn.

Everything calculated to inflame the sexual passion, such as the company of lewd men and women, reading improper books, or indulgence in lascivious thoughts, must be prohibited. These aggravate the disease by causing an increased flow of blood to the penis, the mucous membrane of which is already congested and inflamed.

Sexual intercourse is to be strictly forbidden, not only on account of the danger of contagion, but also because it aggravates and prolongs the disease. In every case, the patient should be informed of the danger of gonorrhœal ophthalmia should the least portion of the urethral discharge be brought in contact with the eye. Exposure to wet, inclement weather without sufficient protection should also be avoided, as it promotes the occurrence of orchitis, rheumatism, and, in some instances, pleurisy.

Therapeutics.—*Treatment of the Stage of Incubation.*—We have referred to the abortive treatment of gonorrhœa by injections of a strong solution of Nitrate of silver. Homœopathy claims to abort the disease in the early stage by the use of internal remedies. Jahr recommends for this purpose the use of Sepia^{30}, a dose night and morning, and states that by the use of this remedy he has been enabled to abort the disease. I must admit that I have not much faith in this statement, and think the author has been mistaken in his diagnosis, having treated urethritis and not true gonorrhœa.

Wahle, for the same purpose, has advised *Bignonia*^{20}*;* Grauvogl, *Natrum sulph.;* Baehr, *Mercurius sol.;* and Kafka, *Sulphur.*

Treatment of the Stage of Inflammation.—**Aconite.**—In the early part of the inflammatory stage of gonorrhœa I know of no remedy comparable with Aconite. The malaise which often accompanies the beginning of this stage, the fever, the inflamed condition of the organ, the burning upon urination, are indications for this remedy which must not go unheeded. The discharge will not diminish under its use, nor will the course of the disease be arrested, but it will relieve the local congestion and pave the way for the action of other remedies.

Mercurius corrosivus may often be indicated in the first stage, instead of Aconite. Aconite corresponds to a violent inflammatory condition with the development of constitutional symptoms. If the inflammation exists without these, we should think of *Mercurius cor.* The orifice of the urethra is inflamed, the glans penis swollen, hot, and painful to the touch; stinging, throbbing pains in the urethra; painful urging to urinate; all the symptoms are worse at night. This remedy has lately become very popular with the old school; it is used by them as an injection, and in the belief that it possesses great value as a germicide.

Gelsemium is a valuable remedy when the inflammatory symptoms are marked, pain acute, and the discharge scanty.

Cannabis sativa is our most important remedy in overcoming the burning pain which so constantly attends gonorrhœa. Jahr says that "during the inflammatory period I at once give Cannabis^{3} morning and night, without paying any attention to consensual symptoms." An examination of its pathogenesis shows how truly homœopathic it is to all the stages of this disease. It follows Aconite nicely, and should be given as soon as the burning, smarting, stinging pains develop. Helmuth and Bell advise its use in the 12th and higher; others have found it to act more promptly in the tincture and in doses of from five to fifteen drops, three or four times a day.

Cantharides is indicated when the deeper portions of the urethra are involved and strangury becomes a prominent symptom. The patient complains of a constant desire to urinate, and passes only a few drops at a time; burning and scalding along the entire canal; hæmaturia; retention, backache, frequent, painful erections, yellow discharge. It is not of itself capable of doing near so much for the general condition of the patient as Cannabis, but for the vesical tenesmus and painful erections it is invaluable. In using Cantharides we should remember its tendency to aggravate the symptoms we are trying to relieve, and should employ it not lower than the third decimal dilution.

Capsicum is of use in conditions very similar to those described under Cantharides; there is a white, cream-like discharge, and intense burning and pricking during and after urinating.

Copaiba sometimes relieves the ardor urinæ when other remedies have failed. The peculiar violet smell of the urine I have not noticed, nor do I believe it to be a symptom of much value. It has a yellow, purulent discharge, burning in the urethra, painful erections, and, in some cases, bloody urine. I use it in the first decimal solution and in five drop doses four or five times a day.

Terebinthina may be required after Aconite or Cannabis, if with the discharge there is much smarting in the urethra.

Oil of sandalwood has won for itself an exalted place in the treatment of gonorrhœa; it is to be used during the inflammatory stage. It relieves the burning pain and has absolute value as a curative agent. The following formula, furnished me by Dr. Brooks, of Hot Springs, I have found reliable in all stages of the disease, though most efficient in the early period:

℞.—Oil of sandalwood, ... ℥j.
Alcohol, ... ʒj.
M. *Dose.*—Ten drops three or four times a day.

Digitalis in the third decimal solution, a dose every three hours, has been used with success by Dr. Charles Mohr when œdema of the prepuce is marked and when there is burning on urination.

The following drugs have been recommended in the inflammatory stage: *Apis mel.*, *Argentum nit.*, *Arsenicum*, and *Petroselinum.*

Treatment of the Stage of Decline.—In the declining stage of gonorrhœa we generally continue the remedies which we have found useful in the preceding stages. Others will be required, however, if a tendency to chronicity is developed.

Sulphur, under such circumstances, will be found as useful here as in many other tedious conditions. Yeldham uses it in obstinate cases, occurring in scrofulous constitutions. The smarting and burning about the meatus with a purulent but not profuse discharge seems to be characteristic of this remedy.

Agnus castus, in chronic gonorrhœa with a yellow purulent discharge, no burning, and absence of sexual desire.

Nux vomica, when the digestive functions are disturbed, and when complaints are made of pressive pains at the meatus, with shuddering; also, when the rectum is involved by sympathy, and frequent, distressing urging to stool is manifested.

Thuja is a remedy of value in chronic cases in which the burning still continues.

Sepia, *Silicea*, *Petroselinum*, *Petroleum*, *Mercurius sol.*, Rhus tox., Ferrum, and Mezereum have been used with excellent results in the later stage of gonorrhœa.

For chordee, *Nux vom.*, *Cantharides*, *Aconite*, *Stillingia*, and *Camphor.* If the symptom becomes very troublesome, we are compelled to resort to sedative remedies. The Bromide of camphor has quite a reputation in this complication; three grains of it should be taken upon going to bed. Lupulin has also been used. Milton prefers the Spirit of camphor above every other remedy in this trouble. He orders from a half teaspoonful to a teaspoonful of the Spirit of camphor in water to be taken on going to bed, and every time the patient wakes with chordee, he is to rise and repeat the dose. In mild cases, one dose for a night or two is usually enough; and even in severe cases the spasm is relieved by the third or fourth night. It sometimes causes nausea and cannot be used.

Local Treatment.—We have defined gonorrhœa to be a local disease, and believing this to be the truth, have, in our practice, frequently resorted to the use of local applications, and with excellent results.

We realize that this kind of medication has always been unpopular among homœopathists, and hence, in referring to it, do so with the knowledge that many of our colleagues will differ from us. But this article would be incomplete should we fail to mention a method of treatment which has proved essential in the hands of every venereal specialist of our school.

In the very commencement of the disease, when the inflammatory symptoms are most active, the uneasy sensations about the urethra, perinæum, and testicles will be relieved by a full bath in water at from 98° to 100° Fahr. The patient need not remain long in the tub, as the full benefit will be secured in from two and a half to three minutes. In very cold weather the bath should be taken at night before going to bed, to prevent taking cold.

Injections of hot water have recently become quite fashionable in the treatment of gonorrhæa; the journals are filled with cases cured by this method. We have been a little disappointed in its use, not finding that certainty of cure which the praise bestowed upon it indicated. Still the treatment has value, and we confidently recommend its use. The water should be used as hot as the patient can comfortably bear it, and injected three or four times a day, from ten to twenty minutes being devoted to the operation at each sitting. Irrigations of the urethra with hot water have become quite popular since the papers on this mode of treatment, by Dr. Curtis, were published in the *Medical Record*.

Injections of medicinal substances should never be used during the inflammatory stage of gonorrhœa. We must wait until the burning pain following micturition has subsided and the flow has lessened. Under homœopathic treatment cases requiring injections will not often occur. But if careful internal treatment has been continued beyond the active stage, and the discharge is still profuse, and we are satisfied that the patient has not violated the rules of diet and hygiene, we should resort to local medication to stimulate a chronic inflammation of the mucous membrane to a state of greater activity. Many substances have been advised for this purpose, which, after attracting the attention of the profession for a little time, have passed into oblivion. Only a few of those which have stood the test of time, and have been confirmed over and over again in practice, will be mentioned here.

℞.—Zinci acetatis,	grs. viij–xij.
Aquæ,	℥iv.

M. S.—Use three times a day.

℞.—Hydrast. submur.,	ʒj.
Aquæ,	℥v.

M. ft. sol. Use three times a day.

℞.—Liquor plumbi,	ʒss.
Aquæ destil.,	℥ij.

M. ft. sol.

This latter is one of Yeldham's favorite injections. He also speaks highly of an infusion of Hydrastis canadensis, using an ounce of the drug to a pint of water.

Helmuth rarely uses injections, but has found good results from the following:

℞.—Zinci sulph.,	grs. iv.
Zinci acetat.,	grs. iv.
Vini opii,	ʒij.
Aquæ destil.,	℥vj.

M. ft. sol. S.—Use three times a day.

Dr. W. C. Goodno, of Philadelphia, has had good results in old cases of gonorrhœa with tender spots in the urethra, flocculi in urine, etc., with the following:

℞.—Fl. ext. ergot,	ʒj.
Aquæ destil.,	℥ij.

M. ft. sol. Use four times a day.

An injection of the sub-nitrate of bismuth has acquired considerable repute among allopathic surgeons. The formula is as follows:

℞.—Bismuthi subnitratis,	ʒi.
Mucilaginis cydonii,	℥ss.
Aquæ,	℥vss.

M.

The bismuth is not soluble in water, and hence remains suspended in the mixture. Its beneficial effect is supposed to be due to its presence in the urethra, keeping the inflamed surfaces separated.

Dr. E. M. Hale recommends the following injection in the inflammatory stage:

℞.—Boracic acid,	grs. x.
Hot water,	℥iv.

This he uses at 102° Fahr. every few hours.

Dr. L. A. Falligant uses the following injection after the inflammatory symptoms have subsided:

℞.—Corrosive sublimate,	gr. j.
Water,	℥viij–xvj.

injecting it night and morning. He has found it of great value also in gleet.

Hydrochlorate of cocaine has recently been advised as an injection for the relief of chordee. Ten drops of a four per cent. solution of the drug were mixed with thirty drops of water, injected, and retained for several minutes, resulting in a perfect cure. With reference to the strength of the above formula, the quantities given are those which will be found most commonly useful, but must be varied to suit the needs of each case. The rule is that an injection should never cause pain; if it does, it is too strong, and should be diluted. The effect desired is a pleasant sense of warmth following the use.

Upon the selection of a proper syringe much may depend. Preference should be given to a good, hard-rubber instrument with a short, thick, cone-shaped nozzle. These are now manufactured by most rubber companies, and are to be chosen because instruments with a long, slender nozzle may, in the hands of the inexperienced, tear the sensitive mucous membrane by being thrust too far and with too much force into the urethra. The parts are carefully made of vulcanized rubber, which insures a steady, smooth motion to the piston and obviates the danger of deterioration of the injection so apt to occur when a metal syringe is used.

Glass syringes, though cheap, are not advised because of their faulty construction.

The physician should carefully instruct the patient in the proper use of the urethral syringe, and this is best done by giving him the first injection before he leaves the office.

How to Give an Injection.—The patient should pass water before the injection is given, so that retained discharge may be washed out, and the mucous surface left clean for the action of the remedy. The syringe is then to be filled with about two teaspoonfuls of the liquid, and its point inserted well into the meatus, the glans penis being grasped by the thumb and finger of the left hand, not above and below, but on each side, of the nozzle.

The objection to holding the penis above and below is that it causes the meatus to gape, and thus allows the fluid to escape along the sides of the nozzle; it also compresses the fossa navicularis, and prevents the injection reaching the part where it is often most needed. The piston is now to be forced down gently and slowly to avoid overflow. The syringe being emptied, the nozzle should be removed, the grasping fingers carefully compressing the meatus as it is withdrawn. The injection, after being held for two or three minutes, is discharged. Bumstead advises that the finger be run along the under part of the urethra while the fluid is retained; he thinks this insures more general distribution, and thus proves more serviceable.

There need be no fear of the injection reaching the bladder; if it does, the urine will neutralize it and prevent harm.

How frequently shall we inject? It is best to commence by giving one injection a day; if this agrees, give them more frequently, but never exceeding three a day.

Injections should be suspended if symptoms of swelled testicle develop, or if they are found to cause over-irritation of the canal.

Finally, if they have been long-continued and the flow still remains, we should not forget that cessation of the treatment will often cure the case.

General Considerations.—The patient will be anxious to keep the discharge from soiling his garments. Bumstead has suggested the wearing of an ordinary pair of swimming-drawers for this purpose. They will be found cheap and efficient.

The burning pain, which is so characteristic of the active stage of gonorrhœa, may be relieved by immersing the penis in water as hot as it can be borne; the burning distress which attends micturition will be lessened by passing water with the penis thus immersed.

Chordee and painful erections may be avoided by the patient taking a very light meal at night; being careful to pass his urine before going to bed; sleeping on a hard mattress, with light bed-clothing, and in a cold room. Erections are especially apt to occur when the dorsal decubitus is assumed; to avoid this, a hard ball should be worn at night, secured to the back by a bandage; this will, by its pressure, arouse the patient should he take this position. To bathe the penis in very hot water before going to bed is also a preventive measure of value. A square of oilcloth placed at the side of the bed, upon which the patient can stand in his bare feet, should erections occur, will be found useful; the shock caused by this sudden application of cold causes the penis to become flaccid.

A troublesome pruritus of the urethra sometimes develops during the third stage of clap; the passage of a No. 16 (American) steel sound will relieve the symptom. Distension of the canal by attempting to pass water with the meatus forcibly compressed will also be found curative.*

The patient should be cautioned against squeezing the penis to see whether a drop of pus can be forced out. This is frequently done toward the close of the disease, and aggravates the symptoms by the force applied to the still sensitive urethra.

In some instances, despite our best efforts, the discharge will continue; all such cases should be carefully examined for incipient stricture, and, if found, should be dilated at once. Low diet continued for too long a time will cause the disease to become obstinate and persistent. Treatment should be continued for at least a week after the discharge has disappeared, nor should the patient indulge in the pleasures of the table until the expiration of this time. For two weeks more he should refrain from spirituous and malt liquors, and, as long as a single drop of the discharge appears at the meatus, sexual intercourse must be avoided, not only to prevent contagion, but because coition will often give rise to a return of the inflammatory symptoms long after they had subsided.

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* Jour. of Cutaneous and Venereal Diseases, vol. i., page 204.

COMPLICATIONS OF GONORRHŒA.

Folliculitis.—The inner surface of the lining membrane of the urethra, especially on the floor of the spongy portion, presents the orifices of numerous mucous glands and follicles situated in the submucous tissue, and named the glands of Littrè. The inflammation excited by the gonorrhœal virus spreads into the ducts of these glands, the lining membrane swells, obliterating the outlets, and thus preventing the escape of secretions; we then have a condition known as Folliculitis.

It is marked by the appearance of a painless swelling about as large as a pea, when first noticed, on the under side of the penis; it is smooth, hard, and movable under the skin, often pedunculated, the pedicle being the elongated duct, the tumor itself being the gland distended with its own pent-up discharges mixed with pus. They run a chronic course, and, if left to themselves, will discharge their contents and remain fistulous. The treatment demanded is to cut down upon and enucleate them, or else to remove a portion of the fibrinous covering, and then keep the wound open. Hepar sulphur., Selenium, and Fluoric acid have been found of service.

Urethral Abscess.—Abscesses in the cellular tissue underlying the urethra occur much more frequently than the last-named trouble. They may appear at any point along the under side of the penis, but are most common beneath the fossa navicularis and in the bulbous portion of the canal at the peno-scrotal angle. If the abscess occurs under the fossa, it will be about as large as a cherry; if occurring in the bulbous portion, it will be much larger, often attaining the size of an English walnut. They are extremely insidious, and are often unnoticed until suppuration has developed. They then cause constant, throbbing pain and discomfort in making water. Commonly, the abscess opens externally, discharges its contents, and cicatrizes. But it may discharge into the urethra, in which case the urine enters the emptied sac, and from there infiltrates the cellular tissue, thus causing urinary fistula.

In treating urethral abscesses, our object is to prevent the discharge taking place internally into the canal. Hence, they should be incised as soon as they are noticed, and the wound should be kept open until the sac has been entirely emptied. When the discharge has taken place into the urethra, the patient must be watched carefully; if any tendency to infiltration is shown, a catheter should be tied in the bladder, so that the water may be carried over the opening. If infiltration has commenced, a counter-opening must be made. Hepar, Silicea, Selenium, and Sulphur are remedies of value.

Inflammation of Cowper's Glands is a rare complication of gonorrhœa; it occurs during the later stage of the disease. Often in the fifth week a small tender swelling is discovered in the perinæum, close to the bulb; pain and a sense of fulness in the perinæum is felt. Difficulty in making water is also experienced. In a few days the abscess points in the perinæum on one side or the other of the raphe. The gland upon the left side is more apt to be diseased. The treatment consists in rest, hot fomentations, and incision as soon as fluctuation can be felt. Hepar sulph., Apis, or Silicea have, in some cases, prevented suppuration, and should always be administered.

The lymphatics may become inflamed during an attack of gonorrhœa; in such cases the reddened lymph-vessels may be traced along the dorsum of the penis from the prepuce to the pubes. It is not a common complication.

Adenitis, or inflammation of lymphatic glands, may also occur, but is usually limited to slight enlargement and redness, disappearing in a few days. *They never suppurate* unless the patient's health is depraved or he has been exposed to great hardship. Usually, a few days' rest will cause them to disappear.

Belladonna, Mercurius, Silicea, and the Iodide of Arsenic are serviceable in such cases.

Phimosis may complicate both gonorrhœa and balanitis. It is a condition in which the foreskin cannot be retracted over the glans penis, and is often congenital. When the penis is swollen from inflammation, and the foreskin is at all tight, we may have phimosis. The treatment should be both medical and local. The first indication is to keep the cavity under the foreskin as clean as possible. For this purpose we use Taylor's phimosis-syringe, which has a flattened nozzle and is perforated with holes on the flat surface. We should wash out the preputial cavity with warm water and then inject a weak solution of Calendula, or, if it is preferred, a solution of Carbolic acid, ʒij. to half-a-pint of water.

If the phimosis is very tight, Gamberini has advised the use of a sponge-tent as a dilator. Special instruments have been devised to accomplish the same end. If the phimosis is due to acute inflammation all operative proceedures should be deferred as long as possible. Much may be done for such cases by rest in bed, low diet, and cold applications to the penis. *Rhus tox.* should be prescribed for puffy swellings of both prepuce and glans. *Sulphur* when the patient is of a scrofulous habit, and *Mercurius cor.* for phimosis in which the prepuce looks like a bladder, with burning biting pains, painfully sensitive to the least touch. *Aconite*, if the parts are red and inflamed, and *Arsenicum* if gangrene threatens. Capsicum, Hepar, Calcarea carb., and Thuja have been found valuable in numerous cases.

Paraphimosis is a condition directly the opposite to the one just described. Here the foreskin has been retracted, but, owing to the narrowness of the preputial orifice or to the swollen condition of the corona glandis, it cannot be restored to its normal position. The narrowed orifice, in its new position, tightly constricts the corona, and as a consequence we have both it and the prepuce so swollen and œdematous that the penis loses its characteristic appearance. The treatment demanded by paraphimosis is immediate reduction. We accomplish this by seizing the body of the penis in the left hand; then, with the thumb and finger of the right hand, by continued pressure and moulding, force the glans backward through the orifice.

Should this method fail, we may resort to an improved treatment recommended by Dr. O'Connor. He covers the penis with a soft piece of muslin, and then wraps it firmly and closely from before backward with a piece of twine. This drives the exudation towards the body, and, on unwinding, the glans will be found to slip through the orifice.* If this fails, we still have the knife, but in using the latter we must remember the location of the preputial orifice. A slight nick will relieve the constriction and allow the parts to return to their natural positions. Aconite is the remedy usually required in paraphimosis, though *Belladonna*, *Rhus*, Cannabis, and Mercurius have been used in numerous cases.

Irritable Bladder.—This is a very common complication of gonorrhœa and may occur at any time during the course of the disease. It is caused either by the inflammation spreading to the bladder and involving its neck, or by a sympathetic irritation of the neck, induced by the condition of the urethra. The symptom usually develops suddenly, the patient noticing that he is obliged to urinate frequently; at first, perhaps, every hour, later, every five or ten minutes. The call must be obeyed or the urine is voided into the pantaloons. The quantity of water discharged is small, and is often mixed with blood and pus. *Vesical tenesmus* is a characteristic symptom, and is due to a spasmodic contraction of the neck of the bladder and muscles of the perinæum in an effort to force out the few drops of urine resting upon it. It is attended with excruciating pain. The constitutional symptoms are not grave, and the condition usually subsides in from three to four days.

Treatment.—Rest in a recumbent position must be insisted upon and a low diet prescribed. The strangury may be relieved by baths in water at from 80° to 82°. The patient should remain in the bath for some time, at first for half-an-hour, the time being gradually increased to an hour or two hours, and taken twice a day. Pieces of ice, enveloped in a condom and inserted into the rectum, are also advised as a remedy for this painful symptom.

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* Am. Med. Digest, May, 1883. Eddowes advises the use of round elastic ligature, instead of the twine.

Cantharides is eminently homœopathic to this condition, and will be found to act with great certainty. It should not be used lower than the third dilution, for fear of aggravation. Our old school brethren have discovered the value of this remedy and use it in doses which are quite infinitesimal. Bumstead orders one drop of the tincture in an ounce of the water, a teaspoonful three times a day. Stronger doses, he says, will only aggravate the disease.

Cannabis for burning, smarting in the urethra, complete suppression of urine, or for nightly urging, with burning pain.

Chimaphila umbellata.—Urging to urinate after the bladder has been emptied; pressing fulness in the region of the bladder. Hughes prescribes this remedy in the lower dilutions or in the mother tincture.

Camphor.—Violent, spasmodic urging, with suppression; or the urine is voided in a thin stream; strangury. Five drops of Spirit of camphor every two or three hours will afford relief.

Tarentula in the most violent cases. The patient passes water every few minutes, and then only a drop or two of dark, red, fœtid urine; the tenesmus exhausts him by its excruciating agony.

Ferrum phos. when the irritability is shown only at night. **Nux vomica** or **Belladonna** if the symptom exists during the daytime.

Apis, Terebinthina, Eupatorium purpureum, or Sulphur may also be required.

Gonorrhœal Rheumatism.—This sequel is a rare disease, having occurred but thirty-one times in nineteen hundred and twelve cases, or about one case in every sixty-two. The greatest difference of opinion exists in regard to the cause of its development. Some observers attribute it to "metastasis;" others see in it an evidence of the constitutional nature of gonorrhœa, while still others explain its existence by a supposed sympathy between the fibro-serous structures and the urethra. The disease attacks all the joints, but seems to prefer the knee and ankle, and is more apt to occur in men than women.

The following diagnostic table from Fournier gives the symptoms of the disease, and at the same time compares it with the ordinary rheumatism.

Gonorrhœal Rheumatism.	Acute Rheumatism.
1. *Cause.*—Urethral inflammation; cold has no influence in producing.	1. No ætiological relation with state of urethra. Ordinary causes, cold or inheritance.
2. Rare in women.	2. Common to both sexes.
3. Non-febrile, even in acute cases.	3. Febrile phenomena more intense and more prolonged.
4. Limited to a small number of joints.	4. Usually invades a number of joints.
5. Less movable; no jumping from joint to joint.	5. Movable to a high degree; jumping from joint to joint.
6. Local pains moderate; sometimes very indolent.	6. Pains rather intense; sometimes excessive.

7. Tendency to hydrarthrosis.	7. No such tendency.
8. No sweating.	8. Abundant sweats.
9. Urine unchanged.	9. Urine changed.
10. Cardiac complications rare.	10. Cardiac complications common.
11. Coincidents.—Ophthalmia; inflammation of synovial sheaths and bursæ.	11. Eye not affected, and the bursæ and sheaths usually escape.
12. Apt to occur in other attacks of gonorrhœa.	12. Relapses frequent, but always independent of the state of the urethra.

The prognosis usually is favorable; directions for treatment will be found in another portion of this work.

Gonorrhœal Ophthalmia is caused by the introduction of the gonorrhœal pus into the eye. It is a dangerous and painful complication. Its symptoms are similar to severe idiopathic cases of ophthalmia, but it differs from the latter by the rapid and destructive course which it runs. Patients suffering with gonorrhœa should be warned of the danger of bringing the discharge of the urethra near the eye. The treatment of a malady so destructive as gonorrhœal ophthalmia should always be confided to the hands of a specialist.

GLEET.

BY W. B. TRITES, M.D.

Synonyms.—Blennorrhœa chronica, Chronic gonorrhœa.

Definition.—Gleet is a name applied to a scanty discharge of sticky, bluish-white mucus from the urethra, resulting from a chronic inflammation of the mucous membrane following gonorrhœa, although the condition may depend upon other causes.

Ætiology.—The causes of gleet are numerous, and the success in the treatment of the affection depends largely upon a correct knowledge of the ætiological factor at work.

The most common cause is chronic inflammation of patches of the urethral mucous membrane, remaining after gonorrhœa. These patches are from half an inch to an inch in length, and are most frequently found in the bulbous portion of the urethra, from four and a half to six inches from the meatus; they are often followed by strictures.

A relaxed, irritable condition of the mucous membrane of the urethra may give rise to gleet. This condition frequently follows badly treated cases of gonorrhœa, and, beside causing gleet, may induce discharges of prostatic fluid, the prostatorrhœa of Gross.

Vegetations or warts, which sometimes follow in the wake of clap, if growing within the urethra, produce an irritation accompanied by a discharge resembling gum-water, constituting a form of gleet.

Chronic inflammation of the crypts and follicles, scattered so profusely along the floor of the canal, also produces this trouble. The inflammation attendant upon urethritis invades by extension these cavities, the resulting pus escapes but imperfectly from their constricted outlets, and its retention keeps up the irritation long after the original disease has been removed.

The lacuna magna, situated in the roof of the fossa navicularis, is often the seat of this species of the disease.

Debility after gonorrhœa is a pregnant cause of gleet. The constitution of the patient has been broken down, either by the long-continued discharge or by the restricted diet upon which he has been forced to live. Experience has proved that this condition can exist and the patient present none of those objective symptoms which are looked upon as characteristic of the condition. Full flesh and color may be present, but on questioning it will be found that the usual amount of exercise cannot be taken without causing fatigue. Hence, in such cases we are not to look for pallor and emaciation, but rather for the physical effects of debility.

The strumous diathesis is also a cause of gleet, and the recent investigations of Otis would seem to prove that commencing stricture, and so-called "strictures of small calibre," are always accompanied by gleety discharges.

Symptoms.—The symptoms of gleet are objective rather than subjective, being attended by very little pain or discomfort. The history of such cases is usually as follows: After an attack of gonorrhœa the symptoms abated, and left a thin, scanty, bluish-white discharge; this is not profuse, merely a drop emerging from the meatus when the urethra is pressed; in other cases the discharge is noticed only in the morning, agglutinating the lips of the meatus, or exhibiting shreds of mucus in the voided urine. The mental condition of such patients is peculiar. The drop of discharge has excited their fears, and its persistence awakens the most fearful imaginings, which the assurances of the physician are powerless to allay.

Diagnosis.—No other disease of the urethra can possibly be confounded with gleet. Its history, and the peculiar character of the discharge, make it *sui generis;* to determine the primary cause is, however, frequently as difficult as it is important from a practical standpoint.

If debility or scrofulosis lay at the root of the disorder, the history of the patient, coupled with his personal appearance, will determine the facts.

If vegetations have sprung up within the canal, the bulbous bougie may be required, but as such growths are usually situated just within the meatus, and are rarely found beyond the lacuna magna, the ordinary ear speculum will be of service in ascertaining their existence.

The presence of diseased follicles and crypts can best be ascertained by the endoscope, but as this instrument is rarely used by the general practitioner, we may depend for our diagnosis upon the occasional appearance, in the discharge, of little lumps of inspissated pus.

Inflamed patches can be detected by the bulbous bougie. A size should be selected which accurately fits the meatus, but not too tightly. It is to be pushed slowly down the canal, and when an inflamed patch is reached, a smarting pain will be felt as the bulb of the instrument passes, and the operator will notice that its onward course is resisted.

Granulations, which very commonly exist upon the inflamed areas, can be determined by the grating feel which they cause as the ball glides over them; also by the presence of blood upon the instrument when withdrawn.

A relaxed condition of the prostatic mucous membrane, as well as chronic inflammation, can be diagnosed by tenderness of the prostate when touched by the finger inserted into the rectum, also by the existing prostatorrhœa.

Otis believes that strictures are the most common cause of gleet, and lays down the rule "that gleet means stricture." A very slight narrowing of the calibre of the tube he thinks sufficient to produce a chronic discharge.

We have so frequently seen gleets dependent upon this cause, that we have made it a rule in our practice never to undertake the treatment of a chronic urethral discharge until we have carefully sounded the patient.

He should recline upon a couch or bed when the examination is made, for in some cases the passage of the instrument produces nausea and even fainting.

Prognosis.—The prognosis in gleet is usually favorable, but the time required to effect a cure cannot be even approximated. It can be cured, but both the patient and physician must address themselves to the task with determination and patience, for its obduracy is one of the legends of medicine.

Treatment.—In the treatment of gleet we are constantly to bear in mind the fact that it is a disease which frequently has its origin in a broken-down condition of the general health, following a long-continued course of treatment for gonorrhœa. Hence, always order such patients a good, plain, substantial diet of fresh meats, vegetables, milk, and eggs. The use of spirituous and malt liquors is to be discouraged, unless the patient clamors for them, when some light wine may be allowed.

The treatment, as stated above, will depend largely on the causative factor in the case in hand. If, on examination, we find a narrowing of the urethra, we must at once dilate, and in this way may often remove the trouble. A congenital narrowing of the meatus sometimes exists, and Otis states that an incision, by restoring the normal size of the outlet, will cure the gleet.

If vegetations are found to exist, we should resort at once to the use of Thuja, a remedy which clinical experience has proved to be of the greatest value for the removal of such growths. Should the warts continue, caustic applications should be tried, touching the growths with the solid Nitrate of silver, using the ear speculum to bring them within reach. But, even after their removal in this way, we should continue the Thuja, hoping thereby to remove the producing cause.

Chronic inflammatory patches of the mucous membrane, whether complicated with granulations or not, require, beside the carefully selected remedy, injections of substances which have the power of exciting a higher grade of inflammation, and one more susceptible of cure. The same remark applies to the treatment of prostatic gleet. Yeldham has advised, and its use is concurred in by Hughes, an injection made by this formula:

℞.—Goulard's extract, ... : . . . ʒss.
Dis. water, ... ℥j.
M. ft. sol.

Injections of Claret have been highly recommended; the wine should be diluted with half its bulk of water in the beginning, the strength being gradually increased as the urethra becomes accustomed to its use. Injections of the Acetate or Sulphate of zinc, in the proportions of two grains of the salt to an ounce of water, may also be used. We need not add to the above many other substances which have been suggested off and on; they all depend upon the same qualities for their influences; the desideratum is to adhere to one injection, and to use it persistently.

The syringe to be used in gleet should have *a long* nozzle, and if the inflamed patches are seated very deeply, or the prostatic mucous membrane is involved, we must resort to instruments constructed especially for the purpose, such as Taylor's modification of Bumstead's syringe. This instrument consists of a hard-rubber tube, six inches long, with an acorn-shaped bulb perforated on its tapering sides with twelve very minute holes; the apex of the bulb is rounded, to avoid injuring the folds of the urethral membrane; the size of the tube varies from 4 to 10 of the English scale, and the widest part of the bulb is two sizes larger than the shaft; a button of hard-rubber slides upon the shaft to regulate precisely the spot to which the injection is to be applied. The advantages of this syringe are that regurgitation is obviated by the shoulder of the bulb; the smallness of the holes prevents too much fluid being thrown in at a time, and the bulb serves as an olivary bougie for exploration.

In using instruments for deep injection we must determine, by the olivary bougie, the exact situation of the spots to be treated. If several exist, we inject the one nearest the bladder first, attending to the others as the instrument is withdrawn. The patient should retain the fluid for a little while after the operation. Sir Henry Thompson has called attention to the fact that the urethra is not a tube, but rather "a continuous, closed valve," and that, from half a drachm to a drachm of fluid will distend from 3½ to 4 inches of its length; hence, only a small quantity of the liquid will be required in giving deep injections.

Sepia will be found a useful remedy in this kind of gleet, and is strongly recommended by Jahr; the discharge is scanty and painless, only a drop or so appearing during the night, staining the linen yellow.

Mercurius sol.—When the discharge is of a greenish-yellow color, and is worse at night. Yeldham prefers Cinnabaris when he uses a mercurial in gleet.

Nux vomica —With a discharge of clear mucus, in debilitated persons, or when the complaint has been aggravated by excess in diet or by the use of beer.

Fluoric acid is recommended by Rosenberg in gleet for a discharge of a yellow drop in the morning, with an oily sweat on the genitals of a penetrating smell.

Capsicum.—Hering advises this remedy in gleet when the discharge looks like fat milk.

Hydrastis.—When there is a feeling of debility and faintness after each passage from the bowels.

Phosphoric acid.—In gleet of debilitated persons, or where the prostatic region is involved; the discharge consists of a few white drops each morning.

Ferrum was first recommended by Hering; it is of value in cases of debility where the discharge looks like milk.

Sulphur is of value in gleet, as in all other chronic diseases, especially when the discharge is absolutely painless and is found associated with a depressed state of the general health.

Pulsatilla will be found useful when the disease seems dependent on a phlegmatic or scrofulous constitution.

Petroselinum.—Where the gleet is attended with burning on micturition.

Cannabis sativa is also to be remembered in gleet; Jahr prefers it to any other remedy, and I have frequently found it of service.

Kava kava, in 5-drop doses, three or four times a day, is spoken of highly by Hale.

Hygienic Treatment.—In the treatment of gleet we must insist not only upon the patient use of the indicated remedy, but upon the careful observance of the rules of personal hygiene. The skin of such patients should be kept in good condition by the use of the flesh-brush and sponge. Lebert reports several cases of persistent gleet cured by sea-bathing. Much time should be spent in the open air, and the mind must be kept employed, or we may have a troublesome hypochondria develop. Everything calculated to excite the sexual passions should be avoided, and regular habits in diet and sleep cannot be too strongly insisted upon.

As long as a gleet is purulent, even in the slightest degree, it is contagious, and though the discharge has become merely a mucous flow, sexual intercourse will aggravate it and delay its cure.

The passage of a full-sized cold steel sound is often of value, acting as a stimulant to the diseased mucous surfaces. Its first introduction may be unpleasant, and the sound should be retained only two or three minutes. Every third day the introduction should be repeated, each time allowing it to remain longer in the canal, until at last it may be introduced daily and retained for some minutes.

In treating gleet we are to remember its chronic character, and we must not become impatient should the cure be delayed. In each case be certain of the cause, select the remedy with care, apply it persistently, attend to the diet and hygiene of the patient, and the affection will be robbed of much of its obduracy.

CHANCROID.

BY W. B. TRITES, M.D.

Synonyms.—The soft, the non-indurated, the non-infecting sore; Chancröide (Clerc), Chancrelle (Diday), Schanker (German).

Definition.—Chancroid is a contagious, venereal ulcer, secreting a virulent, auto-inoculable pus. It is an exclusively local disease, and is never followed by constitutional symptoms.

History.—Chancroid was considered for so many years to be a form of syphilis, that their histories have become identical; hence the reader is referred to the chapters on syphilis, where the subject is treated in full.

Ætiology.—The majority of syphilographers are united in the belief that chancroids originate only from the secretions of other chancroids. A respectable minority hold the disease to be a form of syphilis. The former are called "dualists," because of their belief in *two* venereal poisons, the latter "unicists," a term indicating their belief in but one poison from which both chancroid and syphilis originate.

The dualists are again divided in reference to the spontaneous origin of chancroids, one branch affirming that inflammatory pus, from whatever source derived, applied to an abrasion, will cause a chancroid, and that the sore thus produced secretes a virulent pus and may be cultivated, through an endless series, by inoculation. The other branch deny these views, and affirm that chancroid always originates by inoculation with the virus of chancroids, and never in any other way; that the sores produced by inflammatory pus are not chancroids at all, and cannot be cultivated beyond the second or third generation. Each of these views being supported by numerous cases, careful weighing of the testimony is necessary to arrive at a satisfactory conclusion.

Bassereau has proved conclusively that chancroid is never the forerunner of constitutional syphilis, and that the secretions of the soft sore invariably produce soft sores. These facts were long contested, but to-day they are held by the majority of medical men, and their truth is hardly questioned.

The experiments of Pick, Bidenkap and Wigglesworth seemed at one time to prove that chancroid could be produced *de novo* by inoculations with inflammatory pus. Bumstead fully accepts this as one of its modes of origin, but more recent investigation seems to invalidate the theory. It is not denied that the inoculation of inflammatory pus will produce ulceration capable of being transmitted still further by inoculation, but that sores thus produced are chancroids is most emphatically denied. What the peculiar constituent of the pus of chancroid is that gives it its virulent character is yet to be determined, for under the microscope it cannot be distinguished from ordinary pus. Debility and dirt have been considered as the prime causes of this virulence; that these are factors in the development of phagedæna we are ready to admit, but that they have any influence in converting ordinary inoculations of inflammatory pus into that form of destructive ulceration known as chancroid, we do not believe. "Chancroid is undoubtedly a morbid entity, called into being by its own virus, propagating its species by inoculation of its secretions, and distinguished from all other diseases by its course, symptoms, and termination."*

The investigations of Rollet, of Lyons, have determined that the virus exists not only in the serum of the secretions, but in the pus-corpuscles, the serum being inert when the corpuscles have been carefully filtered out. Dilution with water does not seem to destroy its activity, as Puchè has produced chancroids from a solution in which one drop of the pus was mixed with half a tumbler of water. Sperino has succeeded in inoculating with pus which, for seven months, had been dried upon the blade of a lance. Alcohol, Acetic acid, and high temperature, however, are efficient agents in the destruction of the contagious element.

The virus of chancroid, to become effective, must be introduced beneath the cuticle. Its power of erosion when deposited on the true skin is *nil*, but on mucous surfaces it becomes effective even when no abrasion exists, whether by erosion or absorption has not been determined.

The mode of contagion is usually direct, though mediate contagion, as by the finger or contact with dressings, is not unknown, but is not nearly so frequent as in syphilis.

The relative frequency of chancroid and syphilis seems to vary, not only among different nations, but in the same nation at different times. In this country the initial lesion of syphilis is more common than the soft sore. In France and England, in some years, the soft sore predominates; in other years, the hard or infecting sore. Chancroids occur most frequently upon the poor, and this may be due not so much to filth and depraved health as to the fact that the poor are compelled to gratify the sexual appetite among old prostitutes who have long since passed through the ordeal of syphilis and are only liable to chancroid. The rich, on the other hand, seeking their enjoyment among the latest additions to the ranks of prostitutes, the class most liable to contract the initial lesion, are found to suffer more from syphilis.

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* Berkeley Hill, Local Contagious Disorders, page 455.

Seat.—Chancroids are usually developed in those localities where abrasions are likely to occur during the sexual act. Hence, in about ninty-nine per cent. of all cases the ulcer is situated upon the penis, and especially in the furrow behind the glans or at the root of the frænum.

The inner surface of the prepuce and the tender covering of the glans are also favorite seats of this ulcer. Should a sore develop upon the true skin of the penis, primarily, it would be strong evidence, but *not conclusive*, of its syphilitic nature.

Occasionally, chancroids are developed just within the meatus, and Ricord has known them as deep as the prostatic urethra, though deep venereal sores are more apt to be of the hard variety. They occur, unfrequently, upon all parts of the body, even upon the head and face, though at one time it was believed that these parts possessed peculiar immunity.

Inoculation.—By inoculation we mean the introduction of chancroidal virus beneath the epidermis, for the purpose of diagnosis or for the study of the development and course of chancroid. When the poison is inoculated upon the person bearing the sore it is called auto-inoculation, when upon some other person it is called hetero-inoculation or simply inoculation.

The operation is very similar to that of vaccination ; only in inoculation we make but one incision, and that small and superficial. In performing inoculations, the point of a lance, armed with a drop of virulent pus, is driven into the skin to about the depth of the derma, then withdrawn, and the remaining pus wiped upon the puncture.

Usually, within twenty-four hours evidences of inflammation will be found about the point of inoculation, though two, three, or even more days may pass before the signs of a successful operation develop.

The puncture, if about to "*take*," becomes surrounded by an areola of inflammation, and is converted into a pustule with an exceedingly delicate covering. If this is removed, a circular ulcer, penetrating the whole thickness of the skin, will be discovered ; its edges will be irregular and undermined, its base gray and uneven, and the discharge from it profuse and purulent. If the pustule remains unbroken, the discharges accumulate beneath, and form a thick crust, covering the ulceration. Such ulcers, if left without treatment, will spread with great activity for a certain time, then, losing their destructive characters, they remain for a while stationary, neither increasing nor diminishing in size; finally the base takes on a healthy appearance, granulations spring up, and the ulcers heal.

In performing inoculation, the following rules should be carefully observed:

1st. The pus should never be taken from a sore in which phagedenic symptoms are present, nor should the operation be undertaken upon a person of a broken-down constitution; either circumstance will give rise to troublesome ulceration.

2d. The wound should not be deeper than the vascular layer of the skin; deeper punctures are apt to cause large sores.

3d. We should select a site for the operation distant from lymphatic ganglia, thus avoiding bubo, and one which at the same time is easy of access. The sides of the chest below the nipples fill these indications, and are usually selected for the experiment.

4th. The sore should be thoroughly cauterized with Nitric acid or Carbo-sulphuric paste, as soon as our observations are completed.

5th. The operation should never be undertaken unless we are confident that the patient can be seen at least daily.

Symptomatology.—From the study of numerous inoculations the following facts have been gathered concerning the nature and symptoms of chancroid.

Incubation.—The virus of the soft sore is found to develop without a period of incubation. This fact may, incidentally, appear to be denied, some days intervening between the sexual act and the development of the sore. Such intervals occur, however, only when no breach of surface has taken place, and the virus has had to find its way, unaided, to the deeper tissues.

In 381 cases reported by various observers, 310 exhibited the sore within eight days after coitus; in 111 of these, chancroids developed within three days after infection.

Appearance.—The chancroid first appears as a pustule, surrounded by a pink areola; this is soon converted into an ulcer by the removal of its tender covering. Its base is then found to be *soft* and *pliable*, unless inflammation should complicate the sore, in which case hardness would be developed. The hardness of a chancroid dependent upon inflammation is readily distinguished from the circumscribed hardness of syphilis. One is well defined, and feels as though a split pea were imbedded beneath the sore; the other is less defined, less hard, and fades away with the surrounding tissue. Furthermore, the hardness of chancroid is evanescent, disappearing with the inflammation which gave it birth; that of the initial lesion of syphilis remains long after the lesion itself has healed.

The shape of the ulceration is usually circular, and looks as though a portion of the tissue had been punched out.

When the sore is situated so that one part involves the glans penis, and another part the furrow behind the glans, this circular form is lost, owing to the ulceration spreading more rapidly in the loose tissue of the prepuce than in the compact tissue of the glans.

The edges of the ulcer are ragged, and so undermined that they may be turned back like the sleeve of a coat. This is caused by the ulceration spreading with greater rapidity in the cellular tissue than in the dense, compact tissue of the skin. Owing to interference with the circulation, they present a livid, purple color.

The base exhibits an uneven, " worm-eaten " appearance, and is covered with a grayish, seemingly diphtheritic deposit, composed of the broken-down materials, the result of the ulceration. The softness of the base has been mentioned, and is of great value in diagnosis.

The ulcerative process is deep, extending through all the layers of the skin, and the tendency of the sore is to rapidly destroy tissue; hence the *discharge* is *profuse* and *puriform.*

The size varies from that of a pin's head to that of a silver quarter, though an intermediate size is the most common. Chancroids are not attended by excessive pain, unless spreading with unusual activity, or complicated by inflammation or phagedæna; under such circumstances the pain sometimes becomes excruciating.

Number.—Owing to the secretions of chancroid being auto-inoculable, it is usual to have more than one sore, and owing to the same fact it is not uncommon to have different crops of sores developed. This feature, the multiplicity of sores, will be found of great value in diagnosing between this disease and the initial lesion of syphilis. Of 950 cases, recorded by various authors, 685 had multiple, and only 265 had single, sores. Their number is sometimes surprising, several authorities reporting cases where as many as twenty and twenty-five ulcers were observed in a single person.

The course of a chancroid can be divided into three stages: the progressive stage, the stationary stage, and the reparative stage.

The progressive stage is usually well developed before the patient presents himself. The pustule has been broken, and an ulcer of greater or less size exists, presenting all the peculiarities which have been enumerated. The duration of this stage is variable, but even left without treatment it will, if uncomplicated, at last cease its ravages and the second stage of the disease be developed.

The stationary stage is marked by a cessation of the destructive processes of the ulcer. For a time it neither progresses nor heals, the destructive tendency seems worn out, but healing is impossible. This stage is also variable in length.

The reparative stage is ushered in by certain marked changes in the appearance of the sore. The inflammatory areola disappears, the base of the ulcer becomes clean, and healthy granulations are seen; the sides and edges become sloping instead of undermined, and the quantity of discharge is notably decreased. The healing of such a sore takes place from the bottom entirely, its area not being decreased. When the granulations have reached the level of the surface, a pellicle of skin, looking not unlike a piece of lint, will be developed; this increases until the ulcer is effaced, and a whitish scar remains which soon fades away.

Diagnosis.—The diagnosis between chancroid and the initial lesion of syphilis will be found in the article on syphilis. The earliest form of the chancroid might be mistaken for herpes, but it may be distinguished by the fact that herpes exhibits a circular group of vesicles on an inflamed base; itching is a prominent symptom, and the patient is apt to have had the disease before. A simple abrasion received during coition may look like a chancroid, but the fact of its pus not being auto-inoculable and its tendency to heal rather than to spread, soon determines its nature. Mucous patches seated upon the glans penis sometimes have the appearance of venereal ulcers, but here auto-inoculation again comes to our aid, and the history of the case leaves no room for doubt. Epithelioma of the penis has also been mistaken for the soft sore. The history of the case will solve the question.

In all doubtful cases we must resort to auto-inoculations, and if similar sores result, the case is certainly chancroid. Confrontation, or a comparison of the patient's sore with the one from which it was derived, is a method of diagnosis introduced by Bassereau, and depends upon the fact that chancroid can only originate from a chancroid.

Prognosis.—The prognosis in chancroid is usually good. It is of all the venereal diseases the easiest cured, and least likely to leave dangerous consequences. Still, we are to remember that it is liable to complications both painful and serious. We are never to forget the fact that the sore, under treatment, may be that rare form of the disease known as the mixed chancre; hence we should be careful in answering the question, is it syphilis? The rule of Mr. Hutchinson is an excellent one; he says "give your patient no opinion whatever as to his chances of escape from constitutional infection until he can assure you that a full month has elapsed since his exposure."

Treatment.—The prophylactic treatment consists in the use of the condom and in careful washing after a suspicious intercourse, giving especial attention to the folds and creases of skin and mucous membrane about the genitals.

Hygienic Treatment.—In no disease, perhaps, is cleanliness of more importance than in chancroid. Dr. A. C. Clifton, physician in charge of a large homœopathic dispensary in London, said, at the World's Homœopathic Convention, "I enjoin on my patients, first of all, scrupulous cleanliness." Cleanliness does not mean a constant washing of the sore, but rather attention to the minutiæ of personal hygiene so essential to vigorous health and yet so commonly neglected. The sore indeed will not require much washing, and, if needed, a little warm water and castile soap will fully suffice.

The diet should be nourishing, but not stimulating. Alcohol must be forbidden, for it is one of the most certain causes of phagedæna. Regular hours and habits are, of course, essential to a speedy cure. Erections must be guarded against, for by enlarging the penis they tear the chancroids, and every tear is at once inoculated with the poison, and so increases the size of the sore. Elevating the penis against the abdomen, care in keeping the bladder emptied, sleeping on a hard bed with little covering, and wearing a ball in the back are methods of prevention which should be tried.

Local Treatment.—Chancroid is absolutely a local disease, and when uncomplicated needs only local treatment. The object to be obtained is the destruction of the virulent nature of the sore; if this can be accomplished, we convert it into a simple ulcer which will quickly heal. Two methods of treatment have been devised, each having this object in view; they are the use of Iodoform and the use of escharotics.

In the great majority of cases, sprinkling the cavity of the chancroid with Iodoform will be all that is required, this substance seeming to have the power of robbing the sore of its virulent properties. But occasionally cases present themselves where the ulceration is spreading with such rapidity that a more active remedy is demanded. The actual cautery will here be found of service, or the application of chemically pure sulphuric acid. Nitric acid is also used, but the use of pastes, such as the paste of Ricord, for cauterizing is becoming obsolete because they hide the sore from the operator and make a thorough application difficult. Thoroughness in the application of either of these methods is imperative, for should the smallest part of the ulcer escape, a focus of contagion would exist from which the entire new surface, as soon as the slough should separate, would be at once infected.

In using Iodoform, care should be taken not to spill the powder upon the clothing of the patient, for it has a peculiar and enduring odor, and one which would be readily recognized. It is customary to rub up the substance with an equal bulk of sugar of milk, and to sprinkle this over the ulcer at each dressing until healthy granulations appear. Or it may be dissolved in ether and painted over the sore, the formula being as follows:

℞.—Ether, ... ℥j.
Iodoform, ... ʒj. M.

This preparation partly destroys the unpleasant odor.

Pyrogallic acid has been lately introduced as a dressing in chancroid. It is slightly caustic, and prompt and certain in its action, destroying at once the virulent character of the sore. It is inodorous, and thus offers an advantage over Iodoform. Its use is attended with slight pain, but this is easily remedied by compresses soaked in a solution of chloral.

The use of Salicylic acid is also advised; it also is free from odor, and the pain attending its use is slight.

Nitric or Sulphuric acid can be applied by dipping the end of a match into the acid and then carefully applying it to the entire surface of the ulcer. The first application is painful, but afterward the suffering is not extreme. Ulcers so cauterized should be dressed with a water dressing. One application, if thoroughly done, is usually sufficient.

Dressing and Care of Chancroids.—We have already stated that chancroids will not need much washing; the little required is best done with lukewarm water and castile soap. In most cases all the attention needed will be the absorption of the discharges by the application of pledgets of absorbent cotton. If the chancroid is situated upon a protected or moist surface, as the balano-preputial fold, the dressing may be applied dry, and should consist of absorbent cotton or patent lint, spread over the surface to collect the discharge as it flows. If the sore is situated externally, as upon the skin of the prepuce, a moist dressing should be used. The lint or absorbent cotton should be applied, then wrapped with a narrow net bandage, and over this a piece of oiled silk or thin rubber may be placed. In this way the moisture will be retained and the dressings will not adhere when changed. Should they adhere, beside being painful, it would tear the surface of the sore, and in this way cause a new focus of ulceration.

Salves and ointments of all kinds are not to be used upon chancroids; they become rancid and irritate rather than benefit the ulcerated surface.

Medical Treatment.—Chancroids, though purely local, in some instances require internal medication.

Nitric acid is a most useful remedy. Morgan says "it is as formidable an enemy to the soft sore as Mercury is to the hard variety of venereal ulcer." The indications for its use are: sores at the frænum, edge and inner surface of the prepuce; clean, flesh-colored ulcers with fungus-like base. Ulcers bleed easily and are accompanied with burning pain.

Causticum.—A series of sores under the prepuce, secreting an acid, corrosive pus, of a watery greenish color. In persons of a gouty disposition.

Arsenicum.—An admirable remedy when gangrene threatens; bleeding, purple edges, watery, corrosive fœtid discharge, in weak, broken-down constitutions.

Jahr, believing chancroid to be a manifestation of syphilis, advises the use of Mercurius sol.; he says this remedy will prove of value as long as the sore presents its ash-colored, lardy base. Dr. Hughes agrees with him in this use of Mercury and says "in soft chancre we may rely upon it with the utmost confidence and in quite moderate dosage." Hughes also speaks highly of Nitric acid in chancroid. The rule seems to be, among those who have written on the subject of venereal medicine, to use the remedies in a very low potency. Jahr prescribes the Mercurius sol. in half-grain doses of the first centesimal trituration, night and morning. Nitric acid he uses in drop-doses of the first centesimal solution in the same way. Yeldham gives the Mercury in doses of from five to ten grains of the second decimal three times a day, and of the Nitric acid five to ten drops of the second dilution at the same intervals.

Rosenberg advises Sarsaparilla, and others have mentioned Iodine, Thuja, Sulphur, Kreasote, Lachesis, and Cinnabar.

We have found Nitric acid 2^x internally, and dressings of Iodoform externally, the treatment most effectual in this disease; coupled with cleanliness and regular habits, this treatment has usually resulted in speedy, satisfactory cures.

Complications.—Chancroids are liable to certain complications, which greatly add to their gravity.

Phimosis.—One of the most frequent complications is phimosis, a condition apt to develop when the patient has a long prepuce and the chancroid is situated on the glans penis, in the furrow behind the glans, or upon the inner surface of the prepuce. Under such circumstances, the discharges escaping with difficulty, inflammation ensues, and with it comes swelling and œdema of the loose tissue of the foreskin. When phimosis exists, it is often difficult to determine the nature of the disease producing it, and yet, upon a correct decision will depend the treatment and the prognosis. Autŏ-inoculation is the crucial test. If the discharge proceed from either gonorrhœa or the initial lesion, no effect will follow; if from chancroid, the typical pustule and areola will result.

In phimosis, as a complication of chancroid, all operative procedure is to be postponed, unless gangrene of the prepuce threatens. The reason for this will be evident when we remember the virulent character of the pus of such sores. If circumcision should be performed, the wound would be at once contaminated, and thus converted into a chancroid of gigantic proportions. Hence, in such cases we must keep the cavity of the prepuce clean by washing out the discharges with a 2 per cent. solution of Carbolic acid. Soaking the congested penis in water as hot as it can be borne will often so relax the parts that they may be retracted.

Nitric acid, Mercurius sol., Rhus, and Aconite are often indicated under such conditions.

Phagedæna.—One of the most dreaded complications of venereal diseases is phagedæna. It occurs in both the chancroid and the initial lesion of syphilis, and is a rapidly destructive form of ulceration. Two varieties are distinguished, the serpiginous and the sloughing.

Serpiginous Phagedæna.—In the serpiginous form of phagedæna, the ulcerative process seems to prey particularly upon the superficial cellular tissue; hence, such sores are inclined to extend in surface rather than in depth. They creep, snail-like, over great areas of the body, and are bathed with a profuse, foul-smelling secretion; they exhibit thin, livid edges, which are greatly undermined, and a gray, uneven base, with scattered, florid granulations which bleed at the slightest touch. Their course is variable; one end of such a sore may be cicatrizing, while at the other rapid destruction of tissue is still going on. Often, when cicatrization seems nearly complete, the process of destruction again breaks forth with renewed activity, as though the morbid action showed a particular preference for the newly formed tissue. Such sores may last for years, their secretions retaining their virulent qualities. The cicatrix, left after healing, is peculiar, being white and striated like that of a burn. Little pain attends this form of ulceration, and the constitutional symptoms are not marked.

Sloughing Phagedæna.—This form of phagedæna differs from the foregoing in being more acute, rapid and deep in its destructive action. Its development depends directly upon violent inflammation of the chancroid, and is in reality a molecular gangrene. It spares no tissue, and to its destructive action is to be laid the frequent loss of the virile member, the labia in the female, and many other terrible consequences. The occurrence of this disease in the course of an ordinary chancroid is attended by severe constitutional symptoms, such as a chill, fever, with full, hard pulse and a heavily furred tongue. The pain accompanying is excessive, and forms one of the most dreaded attendants of the disease; the discharge is watery and foul-smelling, and frequently infiltrates the tissues surrounding the chancroid.

The Cause of Phagedæna.—Phagedæna was, at one time, classed as a distinct form of venereal disease, but later observations have proved it to be merely a complication. Mr. Hutchinson teaches that it is in almost all cases the offspring of syphilis, but the teaching is not generally accepted. Dirt, drink, neglect and want are its chief progenitors. Scrofulosis is also a superinducing cause of its development, and persons visiting hot climates and cohabiting with foreign prostitutes are especially liable to phagedæna. The old practice of treating chancroid with large doses of Mercury was one of the most prolific causes of the complication. Beside the causes enumerated, it seems highly probable that phagedæna has a specific nature, and that sores in which it is developed will not only produce chancroid, but *phagedenic* chancroid. Buboes, resulting from phagedenic sores, are prone to take on the same destructive tendency.

Treatment.—The treatment of this terrible complication is of great importance. Ricord used to depend upon the Potassio-tartrate of iron, and called it the born enemy of phagedæna, but latterly it has fallen from the high place he assigned it. Rodet has advised Opium in large doses, thinking that it not only allayed the pain which so often attends this species of ulceration, but that it arrested the destructive process itself. Dusting the surface with Iodoform, as described under the treatment of chancroid, is a modern method, and one attended with a success that leaves nothing to be desired. Since its introduction, cauterization, which was at one time the only treatment, has fallen into disuse. The Iodoform should be sprinkled or dusted over the surface once a day, after it has been carefully cleaned. The discharge from ulcers complicated with phagedæna is profuse and foul, and should be frequently dressed with absorbent cotton or ordinary charpie to soak up these secretions. If the ulcerated surface becomes very large, we should try the method of immersion, suggested by Hebra, and largely practiced by Arthur Cooper. The sore is kept under water, at a temperature of 98°, for from eight to ten hours each day, and at night dressed with Iodoform. This treatment is continued until healing takes place. It has been found of great value in stubborn cases, and gives relief and comfort to the patient at once.*

The diet should be light and nutritious, and the habits carefully regulated. Alcoholic and malt liquors should be avoided. Yeldham advises a tablespoonful of Cod-liver oil every night as an excellent addition to the diet, and we have found the advice of value.

Mercurius corrosivus is a remedy never to be forgotten in phagedæna. Jahr says that it has never left him in the lurch. He uses it in half-grain doses of the first cent. trituration, morning and evening. It speedily arrests the ulcerative process, but should not be repeated too often after improvement has commenced, lest cicatrization should take place too rapidly and only superficially. For this reason he deems it advisable to follow it with some other mercurial, such as the *Mercurius præc. ruber*. Hartman, Baehr, and other authorities, substantiate Jahr's statement. Yeldham recommends the *Biniodide of Mercury* (2d dec. trit.) in doses of from five to ten grains, if Mercury has not already been given; if it has, he advises Nitric acid, ten drops of first or second dec. dilution. *Lachesis* has been found of value, and if gangrene threatens, *Arsenicum* must be used.

Yeldham's very useful dressing for phagedenic chancroids consists of warm flax-seed poultices, followed by a layer of cotton-wool soaked in a Calendula lotion, in the proportion of one part of the tincture to eight of water.

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* See Lancet for 1879, page 350.

Mixed Chancre.—Syphilis may complicate chancroid, giving rise to a peculiar form of sore which Rollet has called the Mixed Chancre. This complication may occur in three ways:

First. The syphilitic virus may be deposited, during coition or otherwise, in an open chancroid. As the result of this, in the course of three or four weeks, the base of the chancroid would become indurated, and constitutional symptoms would follow.

Second. The virus of the chancroid may be deposited in the open initial lesion. In this case, in two or three days, the dry, non-destructive lesion would take on the character of a chancroid; its edges would become ragged, and its secretions copious. The hardness of the base would, however, be undisturbed.

Third. The two poisons may be deposited simultaneously on the same spot, in which case a chancroid would first develop, and, after a lapse of from three to four weeks, its base would become hard, and it would be followed by constitutional symptoms.

The fact that the mixed chancre may exist is of importance in making a prognosis. It should never be forgotten, and an opinion as to the character of a given sore only ventured when the lapse of time excludes the fear of this complication.

BUBO.

BY W. B. TRITES, M.D.

Synonyms.—Adenitis, Adenopathy.

Definition.—The lymphatic glands, especially those of the groin, are liable to enlarge and become tender if inflammatory processes are taking place in the regions with which they are in anatomical relation. Such glandular enlargements have received the name of bubo, and are divided into simple or inflammatory buboes and virulent buboes.

The simple or inflammatory buboes demand no particular attention; they are merely the results of irritation, and pass away with their producing cause; they rarely suppurate, unless occurring in persons of a scrofulous or broken-down constitution. Buboes of this class may occur during an attack of gonorrhœa, of chancroid or any other inflammatory disease of the genitals, and sometimes result from excessive sexual indulgence.

Usually only one gland is affected, though this is by no means a general law. The symptoms which attend this affection are those common to all inflammatory diseases. The patient feels sore, tired and stiff. He detects in the groin a tender, hard lump, which slowly increases in size. They run an indolent course, and finally disappear with the inflammatory affection which called them into being.

Should such a bubo suppurate, the discharge from it would be simple pus, utterly destitute of contagious properties.

The Virulent Bubo is a disease widely differing from the preceding, both as to its cause and tendencies. It has its origin in the absorption, by the lymphatics, of the virulent secretions of a chancroid. *It always suppurates*, no matter what treatment is used or what precautions are taken to prevent. Like the simple bubo, it usually involves but one gland, and this is commonly situated upon the same side of the body as the producing sore. When the chancroid is located close to the frænum, owing to the anastomosis of the lymphatics in that locality, the bubo may develop upon the opposite side of the body from the ulcer, and sometimes a gland in each groin enlarges and suppurates.

Simple adenitis, should suppuration take place, discharges its pus and rapidly heals by granulation, but the virulent bubo runs a very different course. The early symptoms in both forms of the disease are similar; their great difference lies in the fact that the virulent form always suppurates, while the simple form is likely to dissipate.

When suppuration occurs, another peculiarity of the virulent bubo is manifested: the presence of two distinct collections of pus in the one abscess.

The first discharge from a virulent bubo is laudable pus, composed of broken-down cellular tissue, the result of simple inflammation, and is not inoculable. After its escape, the remaining cavity will begin to heal by granulation. In a day or two a second discharge of pus takes place, caused by the bursting of the lymphatic gland in which the virus of the chancroid has been stored. This pus is highly contagious, and at once converts the simple, granulating bubo into an extensive chancroid. The base becomes gray and uneven, the edges everted and undermined, and the destructive ulceration peculiar to the soft sore is developed. The virulent bubo is especially liable to take on phagedenic ulceration, either from negligence or from absorption of virus from a chancroid in which phagedæna exists.

The constitutional symptoms attending the virulent bubo are usually more decided than those seen with the simple form, the fever being higher, the tongue more furred, and the aching and stiffness more marked.

Diagnosis.—We must distinguish carefully between bubo and hernia, nor will this be difficult if we remember that the tumor of a simple hernia is softer, an impulse is felt in it when the patient coughs, and it can be returned. If irreducible, it will give a resonant sound when percussed; if strangulated, the constipation, fæcal vomit, and the gravity of the general symptoms distinguish it.

Varix of the internal saphena vein, at the point where it passes through the saphena opening of the fascia lata, about one inch and a half below Poupart's ligament, has been mistaken for bubo.

It is stated that a varix rises and falls with each inspiration and expiration, and that pressure above the varix will cause it to enlarge and become tense; below, it will be obliterated or greatly decreased.

The diagnosis between the simple and virulent bubo in the early stage is impossible, but if it appears during the first fortnight of the existence of a soft sore it will probably be only the result of inflammation; if after the expiration of a fortnight, it will more likely owe its origin to absorption of virulent material from the chancroid. Again, the virulent bubo is ushered in with more violent symptoms, and the tumor is harder and more circumscribed than in the simple form. The tendency of the inflammatory bubo to resolution is also distinctive, and should suppuration result, the non-inoculability of the pus from the simple bubo, and the inoculability of that from the virulent, will prevent a faulty diagnosis.

Prognosis.—The prognosis in simple bubo is always favorable, unless occurring in persons of a strumous diathesis or of a broken-down constitution; here suppuration may occur, and the resulting abscess may heal slowly. In the virulent bubo the prognosis is always unfavorable, suppuration will surely take place, and great destruction of tissue may follow by ulceration. The virulent bubo is often complicated with phagedæna, and this liability must not be forgotten in making the prognosis.

Treatment.—We shall not describe the surgical procedures required in this affection, but will confine ourselves to the prophylactic, local, and medical treatment. We may prevent the formation of buboes, especially the virulent form, by warning patients suffering with chancroid of their liability to such an accident, and advising them to wear a well-fitting suspensory bandage and refrain from undue exercise. If the bubo has already formed, then rest must be enforced, and a simple but nourishing diet prescribed. The virulent bubo is sure to suppurate, hence we cannot hope to prevent it. If simple in its character, suppuration can be prevented by painting the surface with tincture of iodine and by compression, using for the purpose compressed sponge, held in place with a spica bandage, and then wet with water. The water causes the sponges to swell, and firm pressure is thus made over the tumor.

The simple bubo rarely requires internal medication, for the natural tendency is to resolution; still *Mercurius sol.* is often of service in hastening the process. If much inflammation attends the swelling, or if febrile symptoms are developed, *Aconite* should be prescribed. *Belladonna* is indicated in large, painful buboes, of a deep red hue and intensely inflamed.

In the virulent form Jahr recommends the *Red oxide of mercury* for the inflammatory symptoms, and if this fails he resorts to *Cinnabaris.* If the bubo threatens to suppurate, he gives *Carbo animalis.* If the chancroid from which the bubo originates is in a fungous condition, with easily bleeding base and edges, *Nitric acid* is the remedy. If the bubo is open, and the patient has not had Mercury, Jahr advises *Merc. sol.*, the *Merc. rub. præcip.*, or *Cinnabaris.*

If already drugged with Mercury, then *Aurum*, *Nitric acid*, and *Hepar sulph. calc.* may be used.

If gangrene threatens, *Arsenicum.*

Old, indurated buboes: Carbo anim., Hepar, and Sulphur. In buboes which will not heal, but continue to discharge pus: Silicea, Sulphur, and Fluoric acid.

Should phagedæna develop in the bubo, we must resort to Mercurius cor., and cover the ulcer with large, warm poultices of flaxseed meal. The Biniodide of Mercury in three-grain doses of the second dec. trit. has been found useful in this affection.

When suppuration takes place, we must not neglect the patient's nutrition. The constant discharge draws heavily upon his strength, and this must be met by a nourishing, easily digested diet. A tablespoonful of Cod-liver oil, three times a day, has an excellent effect upon such patients.

HYDROCELE.

BY W. B. TRITES, M.D.

Synonyms.—Hydroscheocele, Hydroscheum, Hydrorchis, Hydatocele.

Definition.—Hydrocele is a serous effusion into the tunica vaginalis of the testicle or spermatic cord. Three varieties of the affection are described: *Simple hydrocele*, when the serous collection occurs in the envelope of the testicle; *Congenital hydrocele*, when the interior of the vaginal tunic still communicates freely with the cavity of the abdomen, and the effusion is occasioned thereby; and finally, *Hydrocele of the spermatic cord*, when the dropsy is limited to that portion of the tunic which enwraps the cord.

Ætiology.—The causes which result in hydrocele are numerous, and must be carefully determined in each case. It is not unfrequently a complication of general dropsy, especially when occurring in broken-down constitutions. It often accompanies varicocele, and is then due to impeded circulation caused by the varicose condition of the efferent vessels; this cause also operates to produce hydrocele when it is found in connection with inflammation of the epididymis. It has been noticed more frequently in warm climates, a peculiarity explained upon the supposition that the enervating temperature relaxes the system and tends to the production of dropsical affections. Relaxed scrotum has also been ranked among the causes of hydrocele. Injuries, such as blows or bruises of the testicle, may, in some cases, cause an effusion into the tunic.

Symptoms.—The early symptoms of this affection are not marked, and usually escape detection, the first symptom to arrest the attention of the patient being the increased size of the testicle. The growth is gradual, and the size attained in some instances is extremely large. The swelling assumes a pear-shaped form, the base being down, and the apex up toward the external abdominal ring; it is firm and elastic to the touch, and anteriorly fluctuation may be detected; posteriorly, the testicle can be felt and seen. The walls of the scrotum are tense, and the superficial veins enlarged and distended. In this affection the body of the testicle is not diseased, the effusion involves only its envelope, not the organ itself.

Anatomy.—Panas and Vétault think that hydrocele is generally due to inflammation of the epididymis, causing compression of the efferent vessels of the testis to such a degree as to produce an effusion into the tunica vaginalis. The fluid thus effused has a pale straw-color, is highly albuminous, and sometimes contains a small quantity of cholesterin, and even a few spermatozoa. After exposure to the air it separates into distinct layers, and has been found to coagulate upon the addition of blood. In recent cases but little change is found in the tunica vaginalis, but where the disease has continued for a long time it is found thickened, and may in this way interfere with the translucency of the tumor.

Diagnosis.—The translucency of hydrocele is the important symptom upon which we depend in diagnosing the affection. To determine the character of a given tumor we proceed as follows:

The patient is taken into a darkened room, the scrotum is grasped, its skin made as tense as possible, and a lighted candle is held behind the tumor but close to it. The physician views the light through the upper part of the swelling, using a roll of paper or the opening in a stethoscope to concentrate the rays. If the swelling is translucent, the disease is dropsical. In old cases, with great thickening of the tunic, this method may fail; we then resort to the exploratory puncture.

Van Buren and Keyes give the following diagnostic table which is of value in differentiating between hydrocele and incarcerated hernia:

HYDROCELE.	INCARCERATED HERNIA.
1. Largest below.	1. Largest above.
2. Commences gradually.	2. Comes on suddenly.
3. Commences at the bottom of the scrotum and grows up.	3. Commences at the external ring and grows down.
4. Is tense or fluctuating.	4. Usually doughy.

5. Cord can be made out (normal) above tumor.	5. Cord cannot be distinguished, or is felt as distinct from tumor.
6. Testicle cannot be found.	6. Testicle can usually be separated from tumor posteriorly.
7. Dulness on percussion.	7. Resonance on percussion (unless hernia be omental).
8. Tumor heavy, but movable.	8. Tumor unwieldy.
9. Reduction impossible.	9. Reduction possible.
10. Size usually constant.	10. Size varies at short intervals.
11. Translucent.	11. Opaque by transmitted light.

The absence of pain makes the diagnosis between hydrocele and inflammatory affections easy, while smoothness of the surface distinguishes it from cancer, cystic or tubercular diseases, and translucency from syphilitic orchitis.

Treatment.—The surgical treatment of hydrocele does not come within the scope of this work, although many cases require the trocar or the knife before relief can be obtained. In recent cases, internal medication, homœopathically, may do much to restore health.

Rhododendron has obtained considerable repute in the treatment of hydrocele. Ozanam reports four cases cured by it; he used the remedy in the lower attenuations, and employed it both internally and externally.

Pulsatilla is frequently prescribed, it being applicable in persons subject to varicose veins and of a lymphatic constitution, with blue eyes and light hair.

Spongia is recommended by Hughes in what he calls acute hydrocele, *i. e.*, inflammation of the tunica vaginalis, independent of the other contents of the scrotum.

Graphites, *Aurum*, *Conium*, *Arnica*, *Silicea*, and *Mercurius sol.* should also be consulted in the treatment of this affection.

Congenital Hydrocele.—When the communication between the abdomen and testicle does not close as it should, the fluid from the larger cavity descends and fills the cavity formed between the folds of the tunica vaginalis, producing a form of hydrocele which is known as congenital hydrocele. It is distinguished from the ordinary form by its shape, being oblong instead of pyriform, by the impulse received on coughing, and by pressure causing the disappearance of the swelling.

Congenital hydrocele is readily cured by pressure; frequent handling of the cord has, in some instances, been followed by a cure. A nicely adjusted truss, pressing on the inguinal canal, will obliterate the abnormal communication. Usually the fluid will be absorbed, but painting with tincture of iodine will hasten its disappearance. *Calcarea carbonica* is a remedy of value in cases of this kind; also, *Helleborus*, *Spongia*, and *Sulphur*.

Hydrocele of the Cord.—Hydrocele of the cord is not an affection of importance; it occurs but rarely, and often disappears spontaneously. Two forms are described, the diffuse and the encysted. In the former, the serous covering of the spermatic cord becomes filled with fluid, derived usually from the abdomen by an abnormal opening into that cavity, and forms an elongated tumor extending from deep in the abdominal ring to the testicle.

In the second variety the tumor is produced in the same way, but only a small portion of the tunic is involved, hence the swelling takes on a globular form, and sometimes attains a considerable size.

The treatment is conducted on the same plan as that described for other forms of hydrocele.

ORCHITIS.

BY W. B. TRITES, M.D.

Synonyms.—Orchitis, Swelled testicle, Gonorrhœa, Epididymitis.

Orchitis is one of the most frequent complications of gonorrhœa, Dron having noted its occurrence in 726 out of 2041 cases of the disease. It is caused by an extension of the urethral inflammation along the ejaculatory ducts, vesiculæ seminales, and vas deferens to the epididymis, tunica vaginalis, and sometimes the testicles. It is rare, however, for the testicle itself to be diseased, the involvement of the tunic having given origin to the belief. The theory that inflammation in the urethra can, by metastasis, pass to the epididymis without involving the intervening structures, is exploded. It is caused, undoubtedly, by a continuous spreading of the disease along the mucous surfaces of the canals which extend from the prostatic urethra to the testicles. The fact that tenderness of the urethra as far as the prostate, together with pain in the perinæum, almost always exists prior to the development of orchitis, goes far to prove that the disease originates by extension. Besides, swelled testicle rarely appears during the early weeks of gonorrhœa, being most frequently seen after the sixth week, though occurring as early as the second or third week. The following, from my note-book, is the record of a case in which the disease occurred five months after the first appearance of the clap, an unusually late development.

J. McM. contracted a gonorrhœa about the 1st of February, 1879; treated himself, or was treated by a druggist, until the 7th day of July, when he called to see me. The discharge had continued until the 3d day of July, was yellowish in color, thin during the day, but thick in the morning on waking; not very profuse, not painful. On the above date he obtained a new prescription which checked the discharge. On the 4th of July he felt sharp pains along the spermatic cord; on the 5th he noticed that the right testicle was greatly swollen and tender. Had a dull, aching pain in the testicle; pain in the abdomen when moving; pain in the loins when breathing; felt chilly, feverish, thirsty. He received Pulsatilla, and made a good recovery.

Ætiology.—The occurrence of orchitis usually depends upon exposure, undue exercise, the use of irritating injections, sexual excitement, or excesses in drink. In most cases one or more of these causes exists. Nevertheless, we must remember that frequently the disease is developed in patients who have been most carefully treated and who have obeyed every injunction. Milton* thinks that changes in the electric state of the atmosphere may exert influence in producing the disease, negative conditions being favorable, and positive conditions unfavorable to its production.

Pathology.—The changes produced by acute epididymitis have only been observed in a few instances, death during this stage being a rare occurrence.

In these cases the vesiculæ seminales and vas deferens were swollen, hard, and of a deep red color. The epididymis was increased in size and of the color of the lees of wine. The ducts of the vasa efferentia, as well as of the vas deferens, were impervious, being filled with a yellowish colored material which under the microscope was found to consist of granular cells, fatty globules, and debris.

The disease attacks the globus minor and the body of the epididymis with greatest severity, but it is not uncommon to have the globus major, as well as the tunica vaginalis testis, involved.

Symptoms.—Yeldham has noticed that orchitis is sometimes preceded as much as twenty-four hours by a violent, stunning headache. He does not think it an invariable precursor, but advises us to be watchful if such a headache occurs. Other prodroma are occasionally present, such as sexual excitement, seminal emissions, pain in the inguinal and lumbar regions, and a general feeling of malaise. A sense of discomfort in the groin of the affected side is usually complained of, followed by sharp pains in the spermatic cord, and tenderness and enlargement of the epididymis. The tenderness and swelling increase so rapidly that within twenty-four hours the scrotum will be found converted into an exquisitely tender, smooth, shining, crimson tumor, its folds being obliterated by tumefaction. The surface is hot, and the least pressure, even that of the bed-clothing, is unbearable.

The left testicle is more frequently attacked than the right, and occasionally the disease develops simultaneously in both. Often, as one testicle is about recovering the other will become affected, and sometimes we have what Ricord has aptly named *see-saw* epididymitis, where the inflammation passes back and forward from one testicle to the other several times. Of course, general symptoms are present, such as headache, furred tongue, high fever, constant thirst, and not unfrequently nausea and other symptoms of disordered digestion. Beside the dull aching pains in the testicle, we may hear complaints of deep-seated pains in the abdomen, aching of the loins and limbs, and a general feeling of soreness. If the vaginal tunic is affected, the tumor will be pear-shaped, and fluctuation will be detected; if the cord suffers, the pain, swelling and tenderness extend toward the abdominal ring.

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* Milton on Gonorrhœa, p. 209.

Acute epididymitis usually terminates in complete resolution, but some hardness of the epididymis, especially of the globus minor, always remains for a long time. If this should be permanent it causes an incurable form of sterility, by pressure upon the efferent vessels obliterating their ducts. This, fortunately, rarely happens. Abcesses of the testicle may follow; but this is also a rare sequela.

Diagnosis.—The diagnosis of acute epididymitis is not difficult. The history of the case, the inflamed condition of the scrotum, the absence of impulse when coughing, distinguish it from hernia, and its opacity will differentiate between it and hydrocele. Syphilitic orchitis is painless, and is never attended by acute symptoms. Should the disease involve an undescended testicle, some perplexity might attend it, but the absence of the body from the scrotum and the history of a urethral discharge would aid us to a correct conclusion.

Treatment.—If patients can be persuaded to avoid undue exercise, sexual excitement, and the violation of dietetic regulations, and to wear a proper suspensory bandage during an attack of gonorrhœa, orchitis will not frequently occur. Should it develop, rest in a horizontal position must be insisted upon. The swollen and tender scrotum is to be supported, either by a wedge-shaped pad or a strip of adhesive plaster two feet long and four inches wide, stretched from thigh to thigh, passing behind the testicles and forming a shelf upon which they comfortably recline. Diday recommends the application of bladders of ice during the acute stage, but patients usually prefer hot applications; flannels dipped into boiling water and applied as warm as they can be borne are often grateful. Van Buren and Keyes speak highly of a poultice made by boiling a paper (℥j) of fine-cut tobacco in ten ounces of water, thickening it by adding a sufficient quantity of flaxseed meal, being careful to stir the tobacco thoroughly through the mass. A poultice of this, about a quarter of an inch thick and large enough to envelop the entire testicle, is applied and renewed every eight hours until the sensitiveness to pressure has nearly passed away. The diet should be plain, a farinaceous one being preferred. The use of instruments in the urethra and injections are to be suspended when orchitis occurs.

In the very onset *Aconite* is most frequently indicated. It relieves the headache and quiets the general inflammatory condition. Helmuth has advised *Gelsemium* when the disease arises from exposure to sudden cold or wet, and there are indications of biliary disorder and congestion.

The action of *Pulsatilla* in epididymitis is marvellous and has excited the admiration of surgeons of the other school of medicine. Drs. Piffard and Fox speak of its wonderful power, and were induced to use it because homœopaths claimed so much for it. Bumstead and, later, F. R. Sturgis have written in favor of its use. The dose employed was one-tenth of a drop of the mother tincture every one or two hours,* "followed in very many cases with excellent effect."

It has the drawing, tensive pain extending into the abdomen; the patient is cold and chilly, despondent, with dull aching pain in the testicle.

Hamamelis, suggested by Franklin, has been found efficacious when the tunica albuginea or the testicle itself becomes involved, with dull aching pain in the testicle, pain in the spermatic cord, the scrotum hot, congested, and smooth from swelling.

Staphisagria should be used more frequently in orchitis; burning, stinging, pressing pains in the right spermatic cord, with drawing and pressure in the right testicle, indicate its use.

If the epididymis remains hard after the inflammation has subsided, *Clematis erecta* is called for.

Aurum is advised, especially when neuralgia of the cord complicates the disease and makes it so unbearable; it seems to act best when the right testicle is involved. It is also an excellent remedy when induration of the globus minor remains after epididymitis.

Belladonna is suited to those cases in which there is great sensitiveness of the nervous system and intolerance of pain, which takes on the character of neuralgia.

The reflex neuralgias which attend epididymitis, in some instances, form a troublesome complication. They are usually unilateral, and are felt in those parts to which the lumbar and sacral nerves are distributed. The pain is excessive and causes the patient the most acute suffering.

Colocynth is one of our sovereign remedies in such cases; Nux vom., Arsenicum, and Sulphur may also prove useful.

For hardness of the epididymis, besides the remedies mentioned, *Rhododendron* and *Baryta carb.* are to be remembered. Such cases usually recover, and the spermatozoa re-appear in the semen.

CARCINOMA OF THE TESTICLES.

BY W. B. TRITES, M.D.

Cancer of the testicles is a rare disease. It may occur at any age from birth to extreme senility, though in persons beyond the age of sixty it is uncommon. It is most frequently seen in early manhood, at the time when the function of the glands is at its highest development. The soft or encephaloid cancer is the only variety which occurs primarily in the testes. It usually involves but one testicle, and comes on rapidly.

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* The Dispensatory for 1880 says a dose of the tincture is half a fluid drachm. Yet we here have direct evidence that the $\frac{1}{300}$th part of this dose is curative. Why?

Injuries, such as blows or wounds, appear, in some instances, to be the exciting cause of the disease; or the affection may develop in a testicle which has been affected by orchitis or sarcocele; in many cases it seems to spring up without any appreciable cause.

Symptoms.—The disease begins by a gradual or rapid enlargement and induration of one of the testicles, which is slightly painful; as this enlargement progresses, the surface of the gland becomes uneven, and points of softness are detected in the hardened testes. The pain increases as the disease progresses, and is described as intense, burning, shooting, coming in paroxysms; it often darts along the spermatic cord. The pelvic and inguinal lymphatics become cancerous as the disease progresses. The enlarged testicle interferes with the circulation, and hence varicose veins are seen knotted over the surface of the scrotum. As the disease progresses, adhesions take place between the testicle and scrotum; at these points ulceration occurs, and through the opening the diseased testicle protrudes in the form of a fungus hæmatodes. The general health, of course, is broken down, and death closes the scene in most cases from eighteen months to two years after the commencement of the disease.

Diagnosis.—In the early stage of carcinoma it is impossible to distinguish it from many other diseases liable to invade these organs. The fact that it is peculiar to very young people, and that it is more painful than other diseases of the testicle, help to distinguish it. Later, when the testicle becomes enlarged and uneven, when the pain is so excruciating, and when the varicose veins appear upon the scrotum, the disease is easily recognized.

Treatment.—The treatment required is castration, and this must be performed very early if we hope to save the patient. If delayed until the lymphatics of the pelvis and groin are involved, the operation is of no avail. The remedies to be used are *Arsenicum*, *Conium*, *Hydrastis*, Nitric acid, *Lapis alb.*, *Cedron*, and others.

CYSTIC DISEASE OF THE TESTICLE.

BY W. B. TRITES, M.D.

This condition is more rare than cancer, and occurs most frequently in young men between the ages of eighteen and twenty-five. It usually involves but one testicle, and the epididymis escapes the disease. When the bulk of the tumor is made up of cysts, it is called cystic sarcoma, but when the solid material predominates and the cysts are few, the name of fibro-cystic sarcoma is applied.

Symptoms.—The growth of a tumor of this kind is slow and painless, and may attain considerable size before it attracts the attention of the patient. The shape is oval and the surface smooth. The only pain experienced is a dragging in the back and loins, from the weight of the enlarged organ. A growth of this kind may remain benign for years, but eventually it becomes malignant, and assumes the symptoms described in the article on cancer of the testicle.

The treatment is purely surgical, castration giving the only hope.

VARICOCELE.

BY W. B. TRITES, M.D.

Synonyms.—Cirsocele, Spermatocele.

Definition.—A dilated, elongated, tortuous condition of the veins of the spermatic cord, due either to increased pressure within the vessels or to diminished resistance in the walls of the vessels and surrounding structures.

Ætiology.—The pendent nature of the parts predisposes them to this condition, and we find in constipation, in tumors variously located, in the pressure from trusses worn in hernia, and in other causes which prevent the upward flow of the blood along the spermatic veins, active agents in developing this predisposition. It is a disease almost confined to young men, a fact which is explained by the frequent congestions which occur from sexual excitement in persons of this class. The left spermatic vein is most frequently diseased; this is owing to its greater length and to its position, which exposes it to pressure from fæcal accumulations in the sigmoid flexure of the colon.

Symptoms.—As stated above, the left vein is found to be varicose in most cases. On examination we can distinguish a pyriform swelling, with its base resting on the testicle and its apex upward, situated behind the gland. If this is grasped gently between the fingers, the enlarged veins are felt rolling under them with a sensation not unlike what would be felt were a bunch of earth-worms concealed within the scrotum. The condition is not usually attended with pain, though neuralgia of the testes may accompany it. The patients generally complain of a feeling of weight and heaviness in the back. If of long duration, atrophy of the testicle may be developed. Hypochondria is not unfrequently associated with the trouble.

Diagnosis.—The diagnosis is easy, as the varicosed veins can be felt as described above.

Treatment.—The treatment for varicocele should never be undertaken until the patient has provided himself with a suitable suspensory bandage. Much benefit results from bathing the parts with cool water, and in all cases constipation must be avoided. *Pulsatilla* and *Hamamelis* are the important remedies for this affection. *Nux vomica* may be needed if the varix is caused by constipation. *Aconite* and

Arnica, if the condition has resulted from injuries. In many cases medicines fail, and the assistance of the surgeon is then required.

PROSTATITIS.

BY W. B. TRITES, M.D.

Acute inflammation of the prostate gland is a rare disease; it sometimes complicates gonorrhœa, or it may be developed idiopathically. The symptoms are similar in the two forms, and hence will be considered together.

Causes.—Irritation, from whatever cause, developed in the prostatic portion of the urethra may produce prostatitis. Tight, contracted strictures, cystitis, calculi in the bladder, wounds or bruises of the perinæum, exposure to wet or cold during the existence of a urethral discharge, irritating injections,—all these are causes from which prostatitis may originate.

Symptoms.—The two leading symptoms of prostatitis are pain and difficulty in micturition and pain in defecation. The earliest symptom complained of by the patient is a sense of weight in the perinæum, attended with a dull, aching pain. He complains of a sense of fulness in the rectum, with ineffectual urging to stool. The enlarged prostate obstructs the flow of urine, hence we have emitted a small stream, accompanied with extreme pain. The calls to micturition are frequent and unsatisfactory. In extreme cases the obstruction may be complete and the discharge of urine through the urethra absolutely arrested. Examination of the gland, by the rectum, will show it to be enlarged, sensitive, and its temperature increased. These symptoms are accompanied with constitutional manifestations, such as fever, restlessness, thirst, furred tongue, and loss of appetite. If the inflammation is not arrested, it may run on to suppuration, though in the majority of cases resolution takes place. If the disease has continued from eight to ten days, the various symptoms increasing in severity, chills occurring with symptoms of general depression, we may conclude that pus has formed within the gland. Prostatic abscesses usually break internally, discharging their contents into the urethra, and this is the termination desired. The accident often takes place while the patient is at stool, or during an effort on the part of the surgeon to pass a catheter to relieve the overcharged bladder. Sometimes the abscess points towards the perinæum, in which case he must incise the tumor as soon as he can be positive that pus has formed, to avoid the burrowing of the pus into the adjacent tissues.

Again, the acute inflammatory symptoms of prostatitis may subside, and leave a condition of chronic inflammation of the gland, attended by a sense of weight and fulness in the perinæum and an increased discharge of prostatic fluid. To this condition the name of prostatorrhœa is often applied; it was first described by the late distinguished surgeon Dr. S. D. Gross, of Philadelphia. It is sometimes mistaken for spermatorrhœa, and to it must be attributed the great majority of those cases in which discharges of semen are said to take place during stool or after micturition. Though comparatively harmless in itself, it causes great anxiety and distress of mind to patients. The microscope settles at once the diagnosis of prostatorrhœa from true spermatorrhœa.

Treatment.—Patients suffering from prostatitis should at once be ordered to bed and put upon a light diet of milk and gruel. The severe pain which so often accompanies the disease may be relieved by hip-baths in water at 100°, repeated several times a day, and followed by poultices of hot flaxseed meal applied to the perinæum.

Retention of urine is relieved by using the flexible catheter.

Aconite is the remedy in the very beginning of the disease; the hot, dry skin, full bounding pulse, thirst, restlessness, burning and tenesmus at the neck of the bladder, with anxious urging to urinate, are symptoms which indicate it.

Mercurius sol. is found of service after the disease is fully inaugurated, when the gland can be felt hard and hot; heavy pressure in the perinæum, and heavy, aching pains are relieved by its use.

Pulsatilla is almost as useful in this affection as in swelled testicles, great heat and pressure in the perinæum, constrictive pains extending to the bladder, with pressure as from a stone, chilliness and thirstlessness.

Cyclamen.—Drawing, pressing pains in the perinæum as from subcutaneous ulceration of a small spot.

Digitalis.—Fruitless efforts to urinate, throbbing pain in the region of the neck of the bladder; frequent desire to evacuate both the bowels and bladder, with scanty passages affording no relief.

Apis.—Stinging, burning pains, and a constant desire to urinate.

Yeldham has had excellent results from the alternate administration of the *mother tincture of Sulphur* and the third decimal dilution of *Mercurius corrosivus.*

Jahr speaks highly of Nitric acid^{30}.

If suppuration is imminent, Hepar, Silicea, and Calcarea carb. may be needed.

For chronic prostatitis: Kali hydriodicum, in one-grain doses, at intervals of four hours, as advised by Yeldham, will be of service. Also Thuja, Iodine, Conium, Aurum, Selenium, Magnesium carb., and Natrum carb.

B. DISEASES OF THE FEMALE GENITAL AND REPRODUCTIVE ORGANS.

DISEASES OF THE OVARIES.

OVARALGIA.

BY JULIA HOLMES SMITH, M.D.

Synonyms.—Ovarian neuralgia, Ovarian irritation.

Definition.—An affection of the nerves of the ovaries, causing pain in varying degrees of intensity, without inflammation or, necessarily, enlargement of the organ.

Ætiology.—The causes are found in the nature of the nerve supply, the intimate relations of the glands to the other pelvic viscera, and the tough, fibrous character of the envelope, hindering even such enlargement of the organ as might be expected from its physiological function.

The ripening and discharge of the ovum, each month, necessitates a congestion of the follicle, some pressure upon the nerves of the ovary, and, unless the woman be in normally good health, more or less discomfort is experienced. Many women who are in the habit of keeping watch upon themselves and noting physical changes, assert that they can tell just at what time of the month to expect the rupture of a follicle and the discharge of the ovum. These persons always complain of neuralgic pain in one ovary, a feeling of enlargement in the ovarian region, and one assured me that, at this time only, she was conscious of the existence of a leucorrhœal discharge.

Apart from the physiological causes of slight ovaralgia, a tedious labor, perhaps involving long-continued pressure of the child's head upon the ovary, may so affect the nerves as to set up a neuralgia more or less persistent.

Pregnancy, by the obtrusion of the enlarged uterus upon the ovary, and the strain made upon the ligaments in the effort of the gravid uterus to rise in the pelvis, causes an ovaralgia which is limited by the puerperal state. Displacement of the uterus has the same effect, notably lateral version of the organ.

The rheumatic diathesis and the hysterical temperament tend to produce neuralgia of any organ. One grave attack of ovaralgia, in the writer's experience, was induced from long-continued dancing in a heated room and then eating ice cream on a piazza. The pain, which was agonizing, came on within half an hour after this imprudence was committed. Another factor in the production of ovaralgia, as indeed of many forms of ovarian disease, is the now fashionable "abdominal breathing." It seems to be the object of the elocutionist to make the diaphragm obtrude as far as possible upon the abdominal cavity, forcing down the pelvic viscera, and necessarily causing trouble. Too much cannot be said in reprehension of this mistaken tinkering with nature. Undue sexual excitement, whether legitimate or otherwise, the abnormal life of the society woman, with its novel-reading, theatre-going, and social excesses, the persistent standing of young women in stores, wearing, as they do, too heavy skirts, high-heeled shoes, and corsets, all have a tendency to promote ovaralgia and many other ultra-pelvic ailments.

Dr. Ludlam says the "daughters of rheumatic fathers are peculiarly liable to neuralgia of the ovaries," and ovaralgia may also be a concomitant of, or it may alternate with, mastodynia.

It is more than probable that ovarian neuralgia may be associated with spinal irritation, the nerves of the ovary coming from the inferior hypogastric plexus which is reinforced by branches from the second, third, and fourth sacral nerves and some filaments from the sacral ganglia. In all the ailments of women much importance must be given to the fact that while the "abdominal brain" may be more potent at times than in the male, yet this very potency is due to some extent to the very intimate relation of the sympathetic with the cerebral system, and the rhythmic life of the woman taxes the brain as well as the pelvic plexuses. Pressure of the monthly congestion of the bloodvessels upon an unimportant filament may, through this intimate family relation, cause one day a neuralgia of the ovary, on the next, pain in the forehead.

Symptomatology.—Pain, sudden and paroxysmal, increased by movement, relieved by pressure, sometimes nausea, and always an excessive flow of colorless urine. The hands and feet become cold, and the patient readily "gives up" to the pain. Hysterical symptoms, viz.: twitching of the muscles, rolling of the eyes, violent weeping, are not uncommon. In protruding the tongue, it trembles and sometimes turns to one side.

When the attack appears at the monthly period, the symptoms are relieved by the freedom of the flow. Sometimes the pain shoots into the bladder, and down into the thigh, being described as a "thrill of pain." Ovaralgia is usually confined to one gland, but both may be affected, and it is sometimes recurrent like the chill of malarial origin; in the latter case it is due to malarial poisoning or to overdosing with quinine.

In very severe cases there is likely to be an accumulation of gas in the intestines, due to reflex nervous action; sometimes so much of this flatus lodges on one side that the sufferer imagines she has a tumor.

The pain of ovarian neuralgia, especially on the left side, sometimes extends upwards, and the patient is then inclined to imagine that she has heart-disease, which belief is the more fixed since palpitation of the heart is a not unfrequent accompaniment of ovaralgia. Constipation may complicate the case, and, in fact, may in a measure be a causative factor, since hardened and impacted fæces passing over the ovary may give rise to a genuine neuralgia.

Diagnosis.—This is readily made from the peculiar quality of the pain, which is not burning, like ovaritis, or pinching, like colic, but has a sudden onset, with remissions, and is relieved by pressure. There is also no swelling of the affected side, although some authors have noted the appearance of a circumscribed tumor, caused, they think, by flatus. This, it seems however, cannot be depended upon as a diagnostic sign, since there are hysterical patients in whom almost any excitement generates gas in the intestines. Another invaluable diagnostic point is the possibility of metastasis of the pain, showing its neuralgic character, and the common occurrence of nervous excitement.

Prognosis.—The prognosis is unsatisfactory. The patient's life is in no danger from ovaralgia, but the chronic condition is one requiring a careful and discriminating treatment, and often such radical change of habits as it is impossible for the physician to secure. The evils in the train of ovaralgia are neurasthenia, insomnia, possibly sterility.

Treatment.—Every effort must be made to insure for the patient healthfulness of surroundings, the establishment of regular habits of life, avoidance of emotional excitement and—a very important point—abstinence from sexual indulgence or stimulation.

Great good may be obtained from the use of daily salt-baths, massage, moderate exercise in the open air, and the exposure of the affected ovary and surrounding parts to the direct rays of the sun for an hour every day. The heat and vivifying power of the sun's rays make it a valuable curative agent not sufficiently appreciated by the profession. The application of hot sand over the painful ovary is also valuable, especially if the sand has been well saturated with sea-water.

Therapeutics.—**Ammonium bromidum** is indicated for a dull, heavy, persistent ache in the ovary; the pain is aggravated by excitement.

Cimicifuga.—Suitable to patients of a rheumatic diathesis, who are subject to dysmenorrhœa and uterine colic.

Ignatia.—Sharp, irritating ovarian pain, abundant and colorless urine, hysterical excitement, neuralgia caused by grief.

Lilium tigrinum.—When the ovary feels as if squeezed in a vice.

Conium.—When associated with the ovaralgia there are sharp twinges in the mammæ.

Zincum val.—Chronic ovaralgia; the pain shoots down the limb of the affected side, even to the foot.

Ferrum et strychnia.—The ovaralgia is the result of anæmia; the mucous membranes are pale, and the menstrual flow is scanty.

Chininum sulph. or **Chinin. arsenicum.**—When the neuralgia is intermittent and of malarial origin.

Local applications may be had for purely palliative purposes. Heat applied dry or by means of cloths wrung out of hot water is valuable. Chloroform liniment is also recommended.

OVARITIS.

BY JULIA HOLMES SMITH, M.D.

Synonyms.—Oöphoritis, Peri-oöphoritis, Ovarian inflammation.

Definition.—Acute or chronic inflammation of each or all portions of the structure of the ovary. There are three varieties of ovaritis: (a), simple inflammation of the investing membrane; (b), follicular or parenchymatous ovaritis; (c), interstitial inflammation and degeneration.

Ætiology.—Simple inflammation may arise from sudden cold or from the extension of peritonitis, with which latter condition it is ordinarily associated; indeed, some writers deny the entity of this variety of ovaritis as a distinct disease. Scanzoni considers it an extension of one of the other varieties, and Schrœder fails to allude to it. Tait calls it ovarian hyperæmia; Thomas does not mention simple oöpheritis, and says "that a dogmatic treatise upon ovaritis in the non-puerperal woman is in the present state of science impossible." Williams names it "ovarian peritonitis," thus recognizing its existence, as do other thoughtful writers, notably Ludlam.

The ordinary progressive congestion incident to menstruation, the rupture of the ripened follicle, the traumatism and effusion which follow, are all possible factors in producing inflammation; and any circumstance which augments the hyperæmia of the ovary at any one of these stages of ovulation causes inflammation of varying degrees of intensity. A sudden chill from cold feet or from sitting on a damp surface may excite inflammation of the serous covering of the organ, even when the physiological process is not in progress. The ovary is also liable to be involved in cases of mild peritonitis, especially that of the puerperal state. This simple inflammation of the peritoneal coat of the ovaries sometimes proceeds to exudation, and then adhesions are formed which tie the gland to adjacent parts.

Follicular or parenchymatous ovaritis may arise from a great variety of causes, and is ordinarily associated with febrile diseases and with inflammation of the neighboring serous membrane, notably in peritonitis or perimetritis; Schrœder considers this inflammation of "no special gynæcological significance in itself; it is only important when it attains a very high degree, as it may end in the destruction of all the follicles, and so result in sterility." The latter part of this sentence nullifies the first phrase; a malady which implies the possibility of sterility should surely not be neglected. Emmet is of the opinion that the ovaries suffer far more from peritonitis and cellulitis than from disease originating within, or confined to, their own structure. Be this as it may, I am not entirely willing to accept Emmet's conclusion, for the investigations of Lawson Tait furnish ample evidence to prove the existence of follicular ovaritis even outside the puerperium. Says Tait:* "In its healthy state the ovary is just like the kidney; it is an organ of the existence of which the owner is profoundly ignorant. . . . But when diseased, no organ in the body gives such discomfort, and its diseases are often fatal. . . . When not fatal, this acute ovaritis leads to a state which makes lifelong misery."

Acute infectious diseases may cause ovaritis, and Slavanski found that the inflammation caused by such infection was in the primordial follicles, and in peritonitis the ripe follicles are the seat of the hyperæmia.

Both the cells of the membrana granulosa and the ova disintegrate; the theca folliculi, likewise, participates in the inflammation.

Gonorrhœa, by producing an inflammation which extends through the tubes, causes this variety of ovaritis. In Hart and Barbour's *Manual*, *latent* gonorrhœa in the male is enumerated among the causes of oöphoritis.

Exposure to cold during menstruation and operations on the uterus which cause metritis will, by extension, result in ovaritis. Phthisis and scrofulosis predispose to this malady, and chronic constipation is an important factor in causing inflammation of the ovary. Subinvolution of the uterus is another cause of ovaritis. The organ, heavier than normal, drags on the tubes and broad ligaments. These, again, make tension on the ovary, which is pressed upon by neighboring viscera, and inflammation is set up which becomes chronic.

Excessive coition and masturbation, factors in nearly all the diseases of the sexual organs, have their due weight here, and ovaritis is also often associated with mastitis. The relation between the mammæ and the ovaries is very intimate, as witness the frequent discomfort felt in the breast before menstruation. Indeed, to my mind the presence of this mammary discomfort is diagnostic of a latent ovarian irritation.

The third variety, *Interstitial Ovaritis*, is an inflammation or infiltration of the connective tissue; this is either a sequence of the follicular variety or is an attendant upon puerperal peritonitis. Schrœder claims that this variety of oöphoritis is extremely rare, except in the puerperal state. It is never idiopathic.

Pathology.—The anatomical structure of the ovary predisposes it to inflammation. We have, first, the delicate peritoneal or serous covering, then the fibrous, soft, connective tissue or *stroma*, studded through and through with Graafian vesicles in various stages of development. Into this dips and ramifies a network of bloodvessels, nourishing the ova with their life fluid. There is a fine mesh of nerve filaments sent from the pelvic plexus, which is reinforced by branches from the second, third, and fourth sacral nerves, the latter fact accounting for the backache associated with ovaritis and for the spinal irritation which so often accompanies this condition.

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* American Journal of Obstetrics, June, 1882, page 548.

When we remember that in each lunar month one or more of the ovarian follicles bursts and discharges a ripened ovule, the chances of such physiological turgescence taking on a pathological aspect is very imminent. Then, too, the relation of the ovary to the pelvic viscera is so close that scarcely any ailment can touch one which does not set up a reciprocal inflammation of greater or less degree in the ovary. Because there have been few, if any, deaths from uncomplicated ovaritis, the pathological changes have been noted only in autopsies after other diseases.

Scanzoni records that gynæcological researches in respect to diseases of the ovaries have been almost barren of results, and yet he has given us a fine description of an inflamed ovary in the body of a woman who died of pneumonia.* "The ovary had a longitudinal diameter of $2\frac{1}{3}$ inches, transverse $1\frac{4}{5}$, and the thickness of the organ $1\frac{1}{30}$ inches. The ovary had an ovoid form, and was enlarged as its volume indicated. The surface of violet-blue covered with numerous dilated veins, and towards the internal angle of the posterior face, was observable, by the blackish-red discoloration, the place of a vesicle which had burst a short time before. The consistency of the organ was doughy, almost fluctuating in parts. On cutting, there flowed considerable blood, and the section showed the same hue as the surface with highly engorged veins. The vesicle in question, on which the place of rupture was perfectly recognizable, was the size of a pea. It still contained in the centre a little liquid and black blood, while a tolerably thick layer of fibrin lined the walls. Two neighboring vesicles had almost the same dimensions, and made a slight projection above the surface of the ovary, and, on opening them, a serous and sanguinolent liquid escaped. Near the other extremity of the organ, where the congestion was less severe, the coat was of a less intense red, and the consistence a little less firm, and there was found in the parenchyma itself an abscess, the size of a bean, containing a serous pus mingled with blood. By the side of this abscess were found smaller ones, varying in size from a millet seed to that of a small pea; all were located quite deeply in the parenchyma and also contained a sanious pus. The entire tissue was infiltrated with serum, and the majority of the vesicles were visibly enlarged by an excessive accumulation of liquid."

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* Treatise on Diseases of Women, page 395.

Interstitial inflammation, says Schrœder, is purely an inflammation of the connective tissue. This is found hyperæmic, swollen, and infiltrated with fluid, and filled with emigrated white blood-corpuscles. The infiltration with small cells may be so great that abscesses will form, and it sometimes results in cicatricial shrinkings and adhesions. There may also arise, as sequence to an ovaritis, a cystic formation which develops to great size. By its obtrusion upon other viscera, and the demand which its growth makes upon the general nutrition, life is endangered, and, as soon as the presence of such cyst is discovered, it should be removed.

Diagnosis.—The diagnosis is not difficult in the rarely seen idiopathic form. The localized pain, fever, vesical tenesmus, dry, hot vagina, pain in the groin when the uterus is moved, indicate the condition. Gonorrhœal ovaritis has such marked symptoms, with its history of infection, that "he who runs may read;" but, when complicated with puerperality, the recognition of ovaritis becomes a matter of considerable difficulty. The subjective symptoms in an acute attack are usually reliable, and the touch is unnecessary and always painful. The differentiation from cellulitis and perimetritis is unneoessary, as the treatment for both is similar, but it is to be remembered that in peritonitis the pain is more diffuse than in ovaritis. Inflammation of the ovary is sometimes mistaken for uterine maladies, and, indeed, is so often complicated with endometritis or metritis that differentiation is difficult.

Ovaritis, particularly when both ovaries are involved, has been mistaken for early pregnancy, the reflex nervous disturbances being similar, and the abdominal enlargement alike in both. It is quite possible to be misled by the cough so common in chronic ovaritis and mistake a case of oöphoritis for incipient phthisis. Differentiation from gastric catarrh and ulceration of the stomach is not easy when ovarian dyspepsia is a prominent symptom.

In every case of occult chronic disease in a woman, we should never be satisfied until a careful examination of the ovaries has been made. Bimanual palpation, one hand over the ovarian region, the finger of the other well up the vagina touching the neck of the womb, will enable the physician to discover uterine tenderness on pressure. A finger in the vagina and one of the left hand in the rectum may possibly discover the enlarged congested ovary, especially if by this congestion it has become very slightly displaced. The ovary will be found a little to one side and behind the uterus. Many think this enlargement may be discovered through the vagina, but it seems to me impossible without the rectal exploration. The pain experienced when the ovary is touched, causes a sick feeling, always eliciting a groan.

Differentiation.—The differentiation of acute ovaritis from hæmatocele is readily made. The onset of the latter is very rapid. The severe and distressing symptoms are felt at first, while in ovaritis the pain is circumscribed, slight at first, increasing steadily in severity, and the extension incident to hæmatocele does not exist. In chronic ovaritis the patient rarely cares to sit or stand upright, but bends the body forward to relieve the pressure of the abdominal parietes. Long walks are impossible, and the jolting of a carriage causes pain which is referred to the ovarian region. Many women complain of pain, tenderness, and a sense of fulness in one or both mammæ just before the menstrual flow begins. Such women are subject to monthly attacks of ovaritis, not necessarily severe, but bearing in themselves possibilities of future trouble.

Symptomatology.—Simple, uncomplicated, acute ovaritis is very rare. Fordyce Barker "is uncertain if he has ever seen a case." It is readily confounded with perimetritis, cellulitis, and peritonitis. In all these conditions there is fever, which may have been preceded by a chill, with the restlessness and thirst usual in inflammations. Differentiation is often difficult, and must depend upon the localization of the pain, heat, and swelling; the latter symptom, however, is not present unless the disease has progressed towards suppuration. There will be sympathetic tenderness in the uterus, notably to touch at the os tincæ; the vagina will be hot and dry. There is present vesical tenesmus with scalding of the urine. In very severe cases the pain shoots down the thigh, and if associated with mastitis, the pain in the ovarian region is almost the same as that felt in the breast.

Puerperal ovaritis is apt to result in an abscess. The swelling in such cases may reach considerable size, and may contain a large quantity of slightly ichorous pus. If, however, pus degenerates, it is likely to burrow its way into the abdomen, causing a fatal peritonitis.

In subacute or chronic ovaritis the symptoms are similar. There is sensitiveness to pressure over the ovarian region, a recurrent or constant pain, which extends through to the back or down the thigh, a sense of burning and weight, and the leg of the affected side is only comfortable when flexed, so relieving the pressure of the abdominal parietes on the ovary. There is apt to be swelling over the ovary; the patient imagines she has a tumor, but the enlargement has this peculiarity, that it now and then disappears entirely. Menstruation is abnormal. There may be amenorrhœa or dysmenorrhœa.

Reflex nervous symptoms are noteworthy. In an anæmic patient there may be quite a troublesome cough, and the apparent pectoral lesions often keep in the background the ovarian trouble which is the real cause of the cough. Dyspepsia torments some patients; this occurrence is so common in connection with ovarian inflammation that Fothergill coined the name "ovarian dyspepsia" to distinguish the complication. Depression of spirits, nymphomania, and some forms of insanity itself are often only symptomatic of ovaritis.

Prognosis.—In uncomplicated ovaritis the outlook is favorable, although Tait is of the opinion that "acute ovaritis is often fatal."

In ovaritis complicated with the puerperal state, the possibilities of danger are great, and allowances must be made for complications. Very slight ovaritis incident to the stoppage of milk-ducts may, if the condition of the patient be favorable, result in quite diffuse peritonitis.

Chronic or subacute ovaritis may be relieved, and many times cured, but there is always to be apprehended possible cystic degeneration and the formation of tumors requiring operative interference.

Sterility is usually the result of incurable ovaritis which has resulted in induration. Abscesses may supervene and life be sacrificed to the debility occasioned by pus formations and discharge.

Neurasthenic disturbances are not uncommon as the result of long-continued ovaritis, and, as before stated, insanity may be the finale of a chronic ovarian disease.

Treatment.—This must be constitutional and local, varying with the cause. Having few reliable provings of our remedies on the female sexual sphere, we are often obliged to prescribe from analogy.

Aconite.—For acute ovaritis, with its high fever, I prescribe *Aconite*, and in the puerperal ovaritis I have often been fortunate in aborting an attack with *Aconite* and *Bryonia* given alternately.

Bryonia is specially indicated if both in ovaries and mammæ there are sharp pains like those of pleurisy. Both of these remedies have served me well in ovaritis with suppression of the menstrual flow from cold, especially where movement of the abdomen in breathing hurts the lame side.

Belladonna, says Ludlam, "in the early stage of peritoneal inflammation where the pains are circumscribed and darting, if the attack occurs from taking cold, or if erysipelatous in character," is a valuable remedy.

Arsenicum alb.—Pain in the ovary which is relieved temporarily by heat, better when the patient moves about; in fact, great restlessness and irritability are characteristic. The attack of pain is periodic, and sometimes alternates with hemicrania, but there is usually constant backache and leucorrhœa, which is acrid and corroding.

Hepar sulphur.—When the pain in the ovary is throbbing and lancinating; feverishness alternating with rigors, suggesting the formation of pus. The inguinal glands are swollen and painful. Sharp, burning urine; stitches in the left side of the back.

Conium.—When the ovaries feel like a heavy lump in the side. There are nodules in the mammæ; amenorrhœa, white, acrid leucorrhœa; cough at night, and sharp stitches in the head during the fits of coughing; constant chilliness, with a disinclination to exertion.

Lilium tigrinum.—Cutting, burning pain in ovaries and left breast; the pain in the breast extends through to the scapula. The patient fears she will become insane. There is pain in the heart as if it "were squeezed and let loose alternately;" dull headache on the vertex.

When ovaritis is complicated with peritonitis, metritis, cellulitis, and perimetritis, the remedies should be selected to cover both the disease and complications.

For subacute or chronic ovaritis the homœopathic physician is rich in remedies. Professor Ludlam has well said that "nearly all the remedies of considerable repute in the treatment of subacute and chronic ovaritis have been prescribed for the relief of menstrual irregularities. The best criteria for their use in ovaritis will be found in their adaptability to menstrual disorders." From my own experience I must say a word for *Belladonna* and APIS MELLIFICA; in uncomplicated chronic ovaritis, with stinging, burning, wearing pain, extending into the thigh of the affected side, these remedies act with remarkable promptness.

Belladonna and **Mercurius corrosivus,** in acute gonorrhœal ovaritis, given at the beginning of the attack, will probably relieve, especially if the ovary feels as if swelling and about to burst. The heat is intense, and the pain is worse at night.

Cantharides.—With the intense pain in the ovary there is a burning in the bladder, and the urine scalds as it passes. The patient urinates frequently, but passes very little at a time.

Thuja.—The pain seems to extend in a line from the inside crest of the ilium towards the outlet of the vagina; the pain is drawing, and the patient feels sick all over; is morbidly sensitive to the touch, has rectal and vesical tenesmus; declares she is tired of life, yet is afraid to die.

Clematis.—Should be a valuable remedy in gonorrhœal ovaritis, because of its proved usefulness in orchitis.

Auxiliary Treatment.—As adjuvants of medicine, application of dry heat to the surface may relieve the pain. Belladonna plaster is useful, and counter-irritation is sometimes desirable. Iodine applied with a camel's-hair brush over the ovarian region produces this effect, and is especially valuable when the disease has progressed to induration.

Copious vaginal injections of hot water should be prescribed, to which may be added *Hamamelis*, *Hydrastis*, or *Hop-tea*. Absolute rest should be enforced in the acute stage, and the rectum should be kept empty. Unless the stools are very soft, their presence will cause pain in the ovary.

If the ovaritis proceed to suppuration, it is best to open the abscess through the vagina, unless it "point" outside, when the iliac region will be the proper location for a puncture. Ordinarily, however, the pus finds its own way through the rectum or bladder. The debility consequent upon the discharge of a large quantity of pus calls for nourishing food, broths, beef-tea, and raw beef finely scraped. As stimulants, wine-whey, eggnog, and quinine in tangible doses will be useful.

In cases of chronic ovaritis, rest, massage, and electricity are to be commended. Lawson Tait insists that we cannot secure the rest needed except by removal of both ovaries and tubes, since every month, or oftener, the inflamed organs are temporarily congested by the occurrence of menstruation; his favorite remedies are Kali bromidum and Ergot. But since these do not often effect a cure, he removes the inflamed ovaries and gives the patient a life of comfort. The argument that this operation unsexes a woman is valueless, since the persistent ovaritis had already rendered her sterile. When, after faithful effort to remove the inflammation by remedies, the disease still exists, surgical skill should be made available for the cure of oöphoritis.

OVARIAN APOPLEXY.

BY JULIA HOLMES SMITH, M.D.

Definition.—Hæmorrhage within the stroma, caused probably by the bursting of a Graafian follicle, which is so excessive as to rupture the distended covering of the ovary and escape into the peritoneal cavity. This accident has received attention from Nélaton, Schrœder, Scanzoni, Thomas, and others. Pelvic hæmatocele has been thought to receive its blood-supply from a rupture of some blood-vessel in the ovary, but clearly such clots should be found near the ovary if from this gland the hæmatocele be formed,—ordinarily, however, these are discovered behind the uterus.

Ætiology.—Possible excessive hyperæmia at the period of ovulation may be one cause of this ovarian apoplexy; a blow upon the ovary at the time of its turgescence may cause an effusion of considerable amount; acute blood diseases sometimes lead to interstitial hæmorrhage in the ovary as in other glands of the body.

Diagnosis.—Diagnosis during life is almost impossible. The sudden pain and swelling, a chill and nausea which suggest intra-peritoneal disturbance, might lead one who expected such hæmorrhage to a diagnosis, but all morbid phenomena of this kind could as well be referred to ovaritis or even perimetritis. A positive differentiation can only be made at the autopsy.

The **treatment** can only be of the so-called expectant method. Do what is possible to relieve the pain, and if hæmorrhage be suspected, exhibit *Aconite*, *Ipecacuanha*, *Hamamelis*, *Nitric acid*, or *Secale cornutum*.

OVARIAN TUMORS.

BY R. LUDLAM, M.D.

Varieties.—Ovarian tumors are either benign or malignant. Happily, the former are the more frequent. They include those cysts and fibroids which are due to an extraordinary development of the proper tissues of the ovary without any new or heterologous deposit in them. Malignant tumors of the ovary arise from cancerous deposition and degeneration. The forms of these growths which are best known are the medullary (cysto-carcinoma), the fibro-cystic (cysto-sarcoma), the colloid, the schirrhous, the encephaloid, the cauliflower or dendritic, enchondroma, and melanosis.

I. *Ovarian Cysts.*

Morbid Anatomy.—No organ in the body is so prone to cystic degeneration as the ovary, a fact which is evidently due to the peculiar anatomy of its follicular formation. Ovarian cysts are simple or compound, single or multiple. A single sac is called a monocyst, and a tumor of this kind, when large or small, is a unilocular tumor; but where there are two or more cysts, it is multilocular. When the added cysts grow and multiply on the inner surface of the sac, the tumor is endogenous: when from its exterior, it is exogenous. The original sac, which was probably a Graafian follicle, is called the parent cyst. The number of accessory cysts developed by proliferation, and otherwise, may reach a hundred or more, and the weight of the tumor will vary from a few ounces to a hundred and fifty pounds. In February, 1878, I resorted to partial enucleation, for the removal of a unilocular cyst weighing eighty pounds. The patient made a good recovery.

When two, or more, of these Graafian follicles develop simultaneously into multiple cysts, the walls of these sacs vary in their thickness. Sometimes they are very thin and easily broken or ruptured. If the cysts are very numerous, the partitions between them may become atrophied, and so distended as to allow their cavities to communicate. The appearance of the interior of such tumors is that of a network of meshes, each of which has constituted a portion of a separate cyst. Single cysts, if they are really ovarian, have thicker and more fibrous walls. When the cyst-wall develops more rapidly than the contained fluid, and grows thicker as time goes on, the case is sarcomatous, or one of cysto-sarcoma. In old cases of compound cysts, especially of fibro-cysts and of multiple cysts that have been frequently tapped, the cyst-wall is sometimes attenuated through the corrosive action of the contained fluid. The older and the more vitiated the contents of these tumors, the thinner their walls, and the greater the danger of their being ruptured accidentally or during an ovariotomy. Exceptionally the coats of these sacs are firm, unyielding in one point, or upon one side, while they are of an extreme tenuity upon the other. The parent cyst is the most tender and has the lowest grade of vitality, at least by the time that these cases come to us for an operation. The epithelial lining of these cysts is the portion that is especially concerned in the cancerous degeneration of the ovary, of which we shall have something to say further on.

All kinds of ovarian cysts are nourished by vessels which are chiefly supplied at the base of the tumor, and which are freely distributed upon its external surface. Dr. Miner was the first to observe that these vessels do not penetrate the interior membranes of the sac, and to take advantage of this fact in removing some of these tumors by the process of enucleation. The capillaries are, however, very numerous beneath the peritoneum, where they form a vascular network and furnish a free supply of blood to the fibrous capsule of the cyst. The veins are sometimes large and tortuous, and not unfrequently give a dark hue to the surface of the tumor. There is also a nervous supply to these growths; and, lying so directly beneath the peritoneum, the lymphatics are numerous, and sometimes very large.

Character of the Cyst-contents.—The ovarian fluids are interesting because of their physical, their chemical, and their microscopical characters. The contents of these cysts vary greatly in different cases, and in the same case at different times, provided they have been tampered with by a mischievous tapping; for each time that a cyst of this kind has been emptied, its fluid becomes more depraved. The newer and the smaller the cyst, and the more recent its formation, the more certain are its contents to be clear, hyaline, and innocuous; while the older and larger cysts and twin-tumors are more likely to contain the *café au lait*, the dense chocolate, or the darker-colored, turbid fluids which are septic in their character. There are, however, exceptions to this rule. The fluid within a parent cyst which has emptied itself spontaneously, or has been discharged by the trocar, and afterwards refilled, is very poisonous. In polycysts, one, a minor sac, may contain a clear, amber-colored serum; another, a honey-like fluid; a third, blood; a fourth, a stinking pus; a fifth, the brown or chocolate fluid; and others, any two or more of these products commingled. Sometimes the contents are so thick and glue-like, or jelly-like, as not to flow at all, in which case the tumor or cyst is of the colloid variety, and therefore, in all probability, but not necessarily, cancerous.

A peculiarity which is common to almost all ovarian fluids is their viscid, gelatinous, ropy, sticky, or syrupy character. This is observed in their contact with the hands and with the instruments used in tapping and in ovariotomy. Sometimes it is almost impossible to wash this sticky matter from the sponges which have been used in such operations.

When chemically examined, these fluids have a specific gravity which varies from 1006 to 1020. The different nitrogenous products, such as albumen, paralbumen, and metalbumen, are always present. "Paralbumen and metalbumen are forms of albumen which differ from the true albumen in that they are soluble in boiling acetic acid. You take a test-tube and boil the ovarian fluid; the albumen is coagulated. You add double the volume of strong acetic acid to the coagulum, boil and shake it, when, if the albumen be true, the coagulum does not redissolve in the acetic acid. But supposing it to be paralbumen or metalbumen, then it either dissolves or forms a whitish transparent fluid, or breaks up into a jelly-like, translucent mass which is quite easily distinguishable from redissolved albumen coagulated by heat. These results led to the belief that we had a means of diagnosing abdominal fluids, and it was said that if the coagulated albumen from them dissolved in acetic acid, they were ovarian, and if it did not redissolve, it was said to be ascitic; and that was frequently right. Sometimes, however, part would redissolve and part would not; and then the supposition was that it was a mixed fluid, some ovarian and some peritoneal; that an ovarian cyst had burst and some of the fluid was in the peritoneal cavity, making a combined fluid which contained some true albumen and some paralbumen; and this inference was really often true, though open to occasional exceptions" (*T. Spencer Wells*).

Dr. Méhu attributes the viscid and ropy character of ovarian fluids to the presence of this paralbumen.*

Fibrine is not present in ovarian fluids unless they are mixed with ascitic fluid, or unless the cyst from which they come is of a dermoid character. "No chemical product peculiar to ovarian fluid has yet been found" (*Garrigues*).

"The glairiness and grayish or yellowish-gray coloration of ovarian fluid is a physical characteristic, practically sufficient for diagnosis from ascitic fluid. Chemical tests for ovarian fluid are not satisfactory, and are of a kind unsuitable for the surgeon who cannot keep up more than a superficial knowledge of the science of chemistry, nor carry spectroscopes and other apparatus about with him; nor are medico-chemical authorities yet agreed upon a perfect test for ovarian fluid" (*Doran*).

According to Eischwald the quantitative analysis of 1000 parts of proper ovarian fluid gives

Water,	931.96
Organic substances,	59.77
Débris,	8.27

When the microscope is applied to the examination of these fluids, it detects the presence in them of blood and pus corpuscles, pigment matter, fatty globules, crystals of cholesterine, and epithelial, inflammatory, and other, cells, the clinical significance of which has not been accurately determined. These morphological elements do not all exist in every specimen of ovarian fluid, but a liquid obtained from the peritoneal cavity which does not contain two, or more, of them cannot be ovarian, unless it came from the normal Graafian follicle of a healthy ovary.

Cholesterine is an almost invariable constituent of this fluid. Its proportion is sometimes very small, and, on account of certain peculiarities that pertain to its crystallization, it may be difficult to find it. Sometimes, however, it is present in such a quantity as to form a thin, glistening pellicle on the surface of the fluid.

In 1846 Dr. J. Hughes Bennett, of Edinburgh, described a granular cell which may be found in ovarian fluids, and which has often been confounded with the ovarian cell. Kœberle, Glugé, Paget, and others, also recognized it and wrote of its significance as a diagnostic sign of ovarian cystomata; but Dr. T. M. Drysdale, of Philadelphia, first noted the micro-chemical properties of the true ovarian cell, and developed its clinical import. Hence it is generally known, in America at least, as the Drysdale cell. This peculiar cell is spherical, sometimes oval, of a yellowish tint, with a very delicate envelope which, upon the addition of acetic or phosphoric acid, becomes transparent, so that its glistening granules are easily seen through the cell-wall in the shape of five or six bright, shining points. It is a little larger than a pus-corpuscle, and has the distinguishing peculiarity that the addition of ether does not dissolve its granular contents, as it will in case of the inflammatory corpuscle of Glugé. "This granular cell may be distinguished from the pus-cell, lymph-corpuscle, white blood-cell, and other cells which resemble them, both by the appearance of the cell and by its behavior with acetic acid" (*Drysdale*).

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* Étude sur les Liquides extraits des Kystes ovariques, in the Arch. Gén. de Médecine, Sept., 1881.

"The large rounded cell-masses found in the cyst-fluid, Bennett's large corpuscles, are epithelial cells in fatty degeneration; while Bennett's small corpuscle, or Drysdale's granular ovarian cell, is no cell, but the nucleus of an epithelial cell in a state of fatty degeneration. There is no pathognomonic morphological element in an ovarian fluid" (*Garrigues*). "The general characters of the fluid, with the peculiar cells referred to, can hardly lead to a mistake, although it is to be remembered that the cells mentioned are merely evidence of rapidly proliferating epithelium, and may occasionally be obtained from fluid secreted in such a cavity as the pleura" (*Angus Macdonald*).

"In fact, I place no reliance on the presence or the absence of these cells in a fluid removed by tapping, and as I never tap removable tumors at all now, I never have any occasion to look for them, or any opportunity" (*Lawson Tait*).

Without pursuing this very interesting subject, we may say that the chief question does not concern the real existence of such a body as the granular ovarian cell, but relates to its true character and its diagnostic importance. This is an unsolved problem, and the most that can properly be claimed for the cell clinically is that its presence in a fluid derived from an abdominal tumor is presumptive evidence that it came from an ovarian cyst.*

Ætiology.—The occurrence of these tumors has been ascribed to various causes, among which are ovarian congestion and inflammation from menstrual derangement and undue sexual excitement and anæmia, with a dropsical tendency. It is very doubtful if childbearing, the scrofulous diathesis, ungratified sexual desire, or high living have any especial effect in causing this form of follicular degeneration. While there are many exceptions in which the disease occurs among the better classes, the majority of cases are found among those whose surroundings are unhealthy, whose diet is poor, and who are subject to many hardships. Quite a proportion of these cases can be traced to some local injury. One of my patients had a multilocular cyst in consequence of falling through the head of a barrel upon which she was standing; another was jammed and injured in the abdomen by a runaway horse; and a third was kicked in the left inguinal region, and a tumor of this kind began to grow almost immediately. Some cases are referable to a strain from lifting, as in carrying coal or water up-stairs, "when something gives way," and the trouble with the ovary begins. Although it may happen that different members of the same family will suffer from cystic tumors of the ovary which are benign in their character, the rule is that when these growths are hereditary they are more likely to be malignant.

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* Those who wish to investigate this subject should consult: ATLEE: The Diagnosis of Ovarian Tumors, 1873, page 458. DRYSDALE: The Ovarian Cell; its Origin and Characteristics. Transactions of the American Gynæcological Society, VII., page 119. GARRIGUES: Diagnosis of Ovarian Cysts, by Means of the Examination of the Contents. The American Journal of Obstetrics, etc., XV., 1, 391, 662. DORAN: Clinical and Pathological Observations on Tumors of the Ovary, Fallopian Tube, and Broad Ligament; London, 1884, page 15, *et seq.*

Clinical History.—Although these tumors are sometimes met with in infancy and childhood before puberty, as well as after the menopause, still, the age at which they are most frequently seen is between 30 and 40, which is really the most active portion of the menstrual life. Like uterine fibroids they begin their course insidiously, and often exist for months or years in a rudimentary state without being detected, or even suspected. In these latter days, when gynæcologists are on the alert, it is not very rare to find a prolapsed ovary lying at some portion of the vaginal roof, within the capsule of which there is evidence of a serous accumulation, and of a prospective ovarian cyst.

Symptoms.—The usual course in these cases is that the patient observes, perhaps accidentally, that there is a "lump," or a swelling, in her right or left inguinal region. She may also discover that it is movable without pain, and that it sometimes disappears, so that she cannot find it again without changing her position; that it is more prominent after taking a full meal, after sleep, or during menstruation; that if it is tender, it is especially so at the month, or after very active exercise; that rough riding and jouncing, or jumping, or straining at stool excites nausea and perhaps vomiting; and that, if it grows at all it is towards the mesian line, and upwards towards the umbilicus. It is after one or more of these lumps have been formed, whether they have been observed or not by the patient or her physician, that the exciting causes already named, and which tend to hasten the degeneration of the follicles, the connective tissue, and the stroma of the ovary, may take effect. If a woman can escape these vicissitudes she may possibly carry such a latent tumor for a long time without harm to herself.

The average history of ovarian cysts extends to about three years. But there is no absolute rule in this regard. In one case, in which I removed a compound ovarian cyst weighing fifty-six pounds, the tumor had been growing steadily for eleven years. In another of my cases a single cyst weighing forty-one pounds had appeared and developed within four months. A marked rapidity of their growth bears with it a suspicion of malignancy which should have weight in the prognosis.

Unless both ovaries are involved at the same time, the function of menstruation is not likely to be arrested, or very seriously implicated. It is quite exceptional, therefore, for the patient to have either amenorrhœa or menorrhagia. But the history of ovarian tumors of all kinds is more or less intimately connected with that of dysmenorrhœa. Indeed, it has been claimed that a large share of ovarian cysts are developed in those who have previously suffered from painful menstruation. In this class of cases the monthly pain and difficulty are sometimes increased, and again they are notably diminished by the development of the tumor. In most cases the uterus and the Fallopian tubes are singularly exempt from invasion, and hence ovarian cysts are seldom accompanied by a leucorrhœal discharge. Well-authenticated cases are, however, on record in which these sacs have discharged their contents through the generative intestine.

The subjective symptoms in a growing ovarian cyst are such as we might expect from a distension of the abdomen and from pressure upon the adjacent organs. Whether the bladder, the rectum, or the uterus is most seriously disturbed in its functions will depend upon the direction which is taken by the developing tumor and the degree of pressure upon the said organs. In the early stages, before the cyst has mounted into the abdomen, these pelvic organs often suffer more than they do afterwards. Later on, when the uterus is retracted, as it almost always is, the sense of weight below the brim of the pelvis is relieved, and if one of the sacs is not anchored within the retro-uterine space the rectal symptoms disappear. If the patient has borne one or more children, the abdominal parietes will yield to the expanding tumor without any great feeling of distension or discomfort, until the freedom of the diaphragm is interfered with. But if these walls are put upon the stretch for the first time by the rapidly filling cyst, the patient will necessarily feel more pain than she otherwise would. In some of these latter cases, where there is an intolérance of the ovarian growth, symptoms analogous to those of pregnancy, such as swelling of the mammæ, the development of the areolæ, and morning sickness, are present.

As the tumor increases in size and becomes abdominal, it is likely to occasion severe attacks of pain and illness that may develop into a form of peritonitis. This plastic peritonitis is the source of those parietal adhesions which, in older cases especially, almost always fasten the cyst to the walls of the abdomen or to adjacent organs so as to arrest its mobility. From the time that the tumor is anchored, the distension and discomfort increase. If it has become attached to the liver, the intestines, or to the omentum, disorders of digestion are likely to follow. Added to these are a sense of weight and suffering in the back and limbs, with inability to lie in certain positions; renal embarrassment, albuminuria, obstinate constipation, and swelling of the legs from pressure, and an encroachment upon the lungs by the greatly increased growth of the tumor, the size of which may finally doom the patient to the sitting posture, as if from chronic heart disease. In extreme cases this narrowing of the vital capacity by pressure upon the diaphragm, and in some cases by actual displacement of the heart itself, causes dyspnœa, palpitation, and a species of cyanosis with puffiness of the features that are very distressing.

Sooner or later, the appetite and the digestion become so impaired, and the drain of serum into the cysts is so continued and exhausting, that a pronounced emaciation and debility are the result. If there is hæmorrhage or suppuration within one or more of the sacs, the collapse or the hectic and prostration are still more certain and rapid. Under these circumstances the skin takes an earthy hue, and the face, neck, and arms especially become so thin and emaciated as to present a marked contrast with the extraordinary size of the body. The peculiar physiognomy of such a case attracted the attention of Spencer Wells, who first styled it the *facies ovariana*, and who thinks it strikingly characteristic.

The objective or physical signs are more clear and satisfactory. Beginning with *inspection*, we observe that the tumor may or may not be symmetrical. The side upon which the swelling was first noted is usually, but not always, the more prominent. If the distension is considerable, the form of the abdomen is peculiar in that its shape does not alter when the patient changes her position. Its profile is unvarying. The umbilicus may be deflected, but it is not retracted or depressed, nor does the region about it become flattened on the top when the patient lies down. In old cases the abdominal walls are stretched and attenuated, and the muscular fibres spread apart, as in advanced pregnancy with twins, or dropsy of the amnion, and the veins stand out prominently at the sides of the tumor. Exceptionally, when there is an unusual deposit of fat beneath the muscles, the striæ are not to be seen upon the integument. In oligocysts, where there are but two or three large sacs, the lines which separate them may sometimes be easily recognized; and the sulci between the solid and the cystic portions of certain ovarian tumors are quite significant. I have learned to place more confidence in the physiognomy of the abdomen as a sign of these tumors than I have in the face itself; although one may indeed help us where the other fails.

By *mensuration*, the size and certain relations of the tumor are easily made out. The measurements usually taken are from the xiphoid cartilage (which may be deformed) to the umbilicus, and thence to the upper margin of the symphysis pubis. This is the perpendicular diameter, and recalls Professor Simpson's rule that, if its length below the umbilicus exceeds that which is above it, providing the case is well developed, the tumor is uterine, and not ovarian. Next comes the girth around the body and over the most prominent part of the tumor; and after that the oblique measurements, which extend from the umbilicus to the anterior superior spinous processes of the right and left ilia. These measurements should be recorded on the spot.

Palpation, or the external touch, gives an idea of the abdominal heat and tenderness, the mobility of the investing integument and of the tumor, the simple or composite character of the tumor, its softness or hardness, the course of its outline, its compressibility, and of the sulci between its component cysts. If the abdominal parietes can be grasped by the handful, the growth is not a large one; if the latter can be carried upwards beneath the umbilicus, the tumor is not uterine.

Bimanual examination shows that, if the cyst can be moved about without changing the position of the uterine cervix, it is probably ovarian. It is not very unusual for the neck of the womb to be so drawn up by the developing cyst as to be beyond the reach of the finger.*

Percussion is invaluable in these cases, because it serves to mark the outline and certain physical characters that are peculiar to the cyst and its contents. The tendency of these tumors to come forward, to lie against the abdominal parietes, and to push the intestines with their contained gases upwards and backwards, out of the way, makes it possible to map out these tumors, and to know whether their contents are fluid, or solid, or mixed. By it we can detect the water-line and the fluctuating wave-line; can often decide whether the serum is contained in a single or in numerous compartments; can judge of its tenuity or its thickness, and decide whether the case is complicated with ascites or with some other incidental affection. The application of this mode of physical exploration will be discussed when we consider the differential diagnosis of ovarian cysts.

Abdominal *auscultation* is of little use in ovarian cystoma, unless it be negatively, or where these tumors happen to be of a composite character.

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* I have now made five ovariotomies where the uterus was so retracted and changed in its contour that it could not be felt or found before the operation. Two of the cases were benign, and made a good recovery; the other three were cancerous and fatal.—R. L.

Tapping or *aspiration* is a means of obtaining information concerning the existence of these cysts and the nature of their contents by drawing off a specimen of the fluid for examination. The safest method of its performance is by the aspirator-needle. The old trocar was too savage, and did so much mischief that in our day there is a strong prejudice against the puncture of these cysts, if we can get on without it. It is the practice of some physicians to resort to the hypodermic syringe for this purpose; but, if the cyst-wall is thick, or the belly is fat-laden, the needle will not penetrate far enough to obtain any fluid. The colloid and the thicker fluids will not flow through a small needle, and we must not always conclude that, because we have failed to draw off anything, the tumor is, therefore, solid. In such a case the needle, if it is long enough, may answer as a probe, and the touch will recognize that it has passed into a cyst-cavity. Where the wall of the cyst is old, thin, and non-elastic, its tissue may fail to collapse, or it may even rupture, when any kind of trocar is withdrawn; and care is, therefore, needed to avoid the risk of an extravasation of the poisonous fluids into the peritoneal cavity. One fatal case is reported from this cause (*Peaslee*).

Tapping from the vagina is not permissible except where one of the cysts has developed within the pelvis, and where, in consequence, the accumulation is large and the rectal or the vesical distress and tenesmus are unbearable.

In case of malignant disease of the ovaries and of the uterus the accumulation may, however, sometimes be drawn off in order to render the solid portion of the tumor more accessible and more easily and surely recognized. It is characteristic of true ovarian cysts that they refill quite readily.

Differential Diagnosis.—In the recognition of ovarian dropsy errors of diagnosis are so frequent, even with the most improved methods of examination, that it is well to bear in mind the rule of a distinguished writer and ovariotomist: "Be careful in the diagnosis, recollecting that no man lives who can differentiate an abdominal tumor with perfect accuracy" (*Storer*).

The diseases and conditions with which ovarian dropsy is likely to be confounded are: pregnancy, extra-uterine pregnancy, ascites, encysted dropsy of the peritoneum, dropsy of the broad ligament, uterine fibromata, fibro-cystic tumors of the womb, uterine and ovarian cancer, physometra, distension and prolapse of the bladder, hypertrophy of the liver and the spleen, renal cysts, and menstrual and fæcal accumulation.

From Pregnancy.—Many of the symptoms of ordinary gestation are found in women who have ovarian dropsy. The abdominal development, the menstrual derangement and arrest of function, the reflex disturbance of digestion and of the nervous system, and the mammary changes and irritation are common to both conditions. But there are points of difference in these symptoms. The ovarian tumor almost always begins at the side and not in the centre of the abdomen; it grows from one side across toward the other, and not from below upwards. More often than in pregnancy the menses are not interrupted, and the flow is regular and sometimes more free than usual. The reflex disturbance of digestion is not of the nature of morning sickness or of vomiting, but is in the form of a diarrhœa, or perhaps of slight attacks resembling cholera morbus. Emaciation is much more frequent in ovarian dropsy than in pregnancy; while the swelling and tenderness of the breasts is a more constant symptom of pregnancy than of ovarian dropsy.

The "touch" may aid very greatly in the diagnosis. In pregnancy, after the fifth month, and more especially in multiparæ, the uterine cervix is considerably softened, swollen, and compressible, and the external os uteri patulous. In uncomplicated ovarian dropsy its shape, size, and cartilaginous character remain unchanged. In pregnancy, at or after the fifth month, we may expect to find the cervix at the superior strait, not far from the promontory of the sacrum. And, although it is frequently drawn up and either anteflexed or displaced toward the affected side in ovarian dropsy, still its location will in most cases not differ materially from that of the unimpregnated uterus. If the internal os uteri was open, and the finger did not come into direct contact with the membranes, the placenta, or with some part of the fœtus, the woman could not be pregnant. The easy introduction of the uterine sound, and its ready passage to the fundus uteri, would also enable you to exclude pregnancy from the list of probabilities. But the sound should not be used unless it is manifest that, if the patient is pregnant, her "term" is very near.

The uterine souffle is not characteristic of pregnancy, as it was once believed to be, for it may be heard in uterine sub-involution, cancer, and fibroids, in tumors of the broad ligament, aortic aneurism, and in ovarian enlargement with or without dropsy. But the detection of the fœtal heart-sound affords an unequivocal sign of pregnancy.

In advanced pregnancy, if the position of the child is favorable, and the abdominal walls are thin, it is sometimes possible to recognize, by palpation, the head or the extremities of the fœtus. Quickening, if it were genuine, would confirm this condition. And yet it has happened that the irregular outline of the proper ovarian tumor has been mistaken for that of the child, while the movements of the fœtus in utero may be counterfeited in various ways.

If the woman is pregnant, the tumor will not sensibly increase in size, or develop in an upward direction, after eight and a half months. When ten or twelve months have elapsed since the swelling was first noticed, it is tolerably certain that there is some kind of a tumor present which might be found in extra-uterine pregnancy, the fœtus then being indefinitely retained. The natural limit for pregnancy is nine months, while the average duration of ovarian dropsy is about three years.

From Extra-uterine Pregnancy.—In the great majority of cases extra-uterine fœtation terminates by a rupture of the cyst, and pelvic hæmatocele, at or before the fourth month. Under these circumstances there is little risk of confounding the tumor with ovarian dropsy. But when the sac has not burst, and the fœtus has become encapsuled, more especially if it has not been mummified, but has developed and remained plump, with a large amount of serous fluid around it, it may be very difficult to diagnosticate it from ovarian dropsy.

If we remember that, although its cavity is not necessarily enlarged, the tissues of the uterus are softened and dilated in this form of pregnancy; that the finger can be passed into it for the purpose of conjoined manipulation; that cases of extra-uterine pregnancy which are extended in this way are almost always of the tubal variety, which makes the tumor accessible from the side of the uterine cavity; and that extra-uterine *ballottement* is therefore available to detect a floating solid just outside of the uterus,—it may assist us greatly.

Tapping with the ordinary trocar in such a case is murderous, for in extra-uterine pregnancy, unless there has been a great deal of adhesive inflammation, the walls of the sac will not collapse and close when the instrument is withdrawn, as they usually do. The consequence is an overflow of its vitiated contents into the peritoneal cavity, and death from sepsis. We must, therefore, take the aspirator in preference, and while its slender trocar is being passed, or afterwards, use it carefully as an exploring needle by which we may recognize the bony parts of the fœtus if there is one. Simon's rectal exploration is a dangerous expedient on account of the risk of rupturing the extra-uterine sac, which is usually very delicate; and an unsatisfactory one, because, unless the fœtus is mummified, it gives no positive evidence, and therefore could not help us to distinguish this form of pregnancy when it is most likely to be confounded with ovarian dropsy.

From Ascites.—Ascites is a secondary or symptomatic affection, depending most frequently upon chronic disease of the liver, the kidneys, the spleen, the intestines, or possibly of the heart and lungs. It is often an accompaniment of chronic peritonitis, and more especially of that form of it which is incident to tuberculosis and to malignant disease of the uterus and its appendages, or of the intestines and the mesentery. Ovarian dropsy is an idiopathic disease, and is not necessarily linked with any of the dyscrasiæ.

In ascites, if the patient lies on her back with her knees drawn up, the abdominal tumor becomes flattened anteriorly and "bulges," or spreads out, laterally. The sides and flanks, as well as the front surface of the enlargement, except directly around the umbilicus, are dull and flat upon percussion. Around the navel, however, unless the distension is very great, there is a resonant sound in ascites. If she turns upon either side there will be dulness upon that side, and resonance upon the other. But in ovarian dropsy the contour of the tumor is not changed when the patient changes her position. It is not flattened in front when she lies upon her back. Its margin is easily mapped out. The flanks are not distended. There is no dulness or bulging in the lumbar regions, but a resonance which is quite clear and characteristic, and which assures us that the intestines lie behind a circumscribed sac, whatever its contents may be.

In ascites the "touch" recognizes a fluctuation in the Douglas pouch which is often lacking in ovarian dropsy. In ascites, also, the accumulation begins at the lowest and most dependent part of the abdomen, while in ovarian dropsy the tumor usually commences in the right or the left hypogastrium, or in one of the iliac fossæ. When it exists, extreme dropsy of the abdominal walls is almost always conjoined with malignant disease. Coincident œdema, especially of the feet, may exist from the first in ascites, but seldom occurs in ovarian dropsy except in the last stage of the disease.

Tapping is a useful means of differentiating between these two affections. Having withdrawn the serum in case of ovarian dropsy, we find that the solid or semi-solid tumor does not float out of reach, as before the operation, but that it may now be quite readily examined and grasped by the hand through the abdominal parietes. After tapping, therefore, the size, shape, and location of this tumor can be so well made out that we need not confound it with such hypertrophy of the liver, the spleen, or of the mesenteric glands, as might have attended upon ascites.

From Encysted Peritoneal Dropsy.—This is the form of abdominal dropsy in which those who have attempted to make an ovariotomy have sometimes failed to find any cyst or tumor when the fluid was discharged. It is a circumscribed ascites which has resulted, first, from a plastic peritonitis that has formed a kind of sac through the adhesion of the inflamed surfaces; and second, by the effusion of serum which is contained in the said pouch, be it large or small.

The physical signs of this limited dropsy are precisely the same as those of ovarian dropsy. But the former is always either traumatic or malignant, has no necessary connection with the menstrual function, is almost always central from the first, grows more rapidly, is not usually accompanied by a marked emaciation and failure of the general health, and almost always disappears with one or two tappings by the exploratory incision, or from a spontaneous rupture of the extemporized sac. Usually, but not invariably, the contained fluid is very thin and of a light color, with an absence of the physical qualities of the ovarian cyst-fluid.* This is the kind of "ovarian tumor" which is sometimes cured by electricity, massage, or by internal medication, when, in reality, it is not an ovarian tumor at all, but a kind of sacculated dropsy that is common to men and women alike.

From Cysts of the Broad Ligament.—The signs which accompany these parovarian cysts so closely resemble those of true ovarian dropsy that one is often mistaken for the other. Tait and others are satisfied that monocysts almost always originate within the folds of the broad ligament. If this is true, many of them have been removed, and the operation recorded as an ovariotomy. The only absolute means of knowing a cyst of the broad ligament from one of the ovary, excepting the exploratory incision, is by tapping. The fluid obtained is clear, like spring-water, or slightly opalescent, non-albuminous, with a specific gravity of 1006 to 1012, and a feebly alkaline reaction. The quantity of this fluid averages from two to ten pounds, but it may sometimes reach twenty, or more. A diagnostic peculiarity of these parovarian cysts is, that their evacuation leaves the abdomen in the form of what is called "the scaphoid belly," a condition in which we shall fail to detect any cyst-wall, or sac, through the parietes, as could be done in the case of an ovarian tumor. These cysts, like those of the peritoneum which have just been described, almost never refill when they have been emptied, whether intentionally or accidentally.

From Uterine Fibromata.—Although ovarian dropsies may be accompanied by irregular menstruation, in which the flow is either too frequent or too copious, or both, we cannot properly say that they are prone to uterine hæmorrhage. Indeed, the dropsical and the hæmorrhagic diatheses rarely coexist. Statistics show that only *nine* per cent. of the cases of ovarian dropsy are accompanied by menorrhagia, while *seventy* per cent. of uterine fibroids are marked by this symptom.

In uterine fibroids the tumor is hard and mobile. Its mobility is diagnostic, for the adhesions which anchor an ovarian tumor, especially if it is an old one or a compound one, are usually lacking in fibroids; and the consentaneous mobility of the uterus and the tumor is a pretty certain test of its origin and of its attachments.

The distance to which the uterine sound will pass is also significant. If it enters more than three inches, the uterus is enlarged; and, under the circumstances, an increase of its depth is one of the most certain and constant signs of these fibroid growths. In uncomplicated ovarian dropsy the womb is sometimes elongated, but this is in consequence of its displacement and of the pressure of the tumor upon it. The changes in the depth and size of the uterus which are present in most cases of fibroids do not properly belong to the clinical history of ovarian dropsy.

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* For an account of five cases of this kind which had been mistaken for ovarian tumors, *vide* the Clinique, vol. iv., p. 243.

Unless they undergo a cystic degeneration, which is exceptional, uterine fibroids are of much slower growth than ovarian cysts. Uterine displacements and leucorrhœa form a natural and almost necessary part of the history of fibroids, while they are generally absent in ovarian dropsy. Although two of Dr. McDowell's original ovariotomies were practiced upon colored women, ovarian dropsy is very rare among the negroes, while uterine fibroids are comparatively much more frequent among them than with white women.

From Fibro-cystic Uterine Growths.—When subperitoneal fibroids of the uterus have undergone cystic degeneration, it may be very difficult to diagnosticate them properly so as not to confound them with ovarian cysts. This difficulty is increased by the occasional absence of menorrhagia, and also of the greater depth of the womb, which are almost constant signs in other uterine fibroids. The rate of growth in the early history of a fibroid is very slow; while after a cyst or cysts begin to form in their substance they may develop very rapidly. The character of the fluid drawn by tapping is very different in the two cases; but the exploratory incision is a *dernier ressort.*

In physometra, the womb being distended with gas, the tumor is tympanitic on percussion over its whole extent, instead of dull and flat, as in ovarian dropsy. Besides, the swelling can be readily removed by passing a catheter through the uterine cervix, or by putting the patient under the influence of an anæsthetic. Physometra is always attended by certain hysterical manifestations which are absent in ovarian dropsy, and hence it has been styled the "hysterical pregnancy."

From Distension and Prolapse of the Bladder.—The skilful use of the catheter and of conjoined external and internal manipulation will suffice to decide between these conditions and ovarian dropsy.

From Hypertrophy of the Liver and Spleen.—Hypertrophy of the liver, like atrophy of that organ, is invariably associated with chronic disease thereof. Ascites, jaundice, bilious colic, digestive disorders, as well as the form and site of the tumor, and the fact that it began to develop in the hepatic and not in the ovarian or uterine regions, are important points of differentiation. The local pain, and the reflex pain, as well as the continued growth of the hepatic tumor from above downwards, are diagnostic.

So, also, with an abnormal development of the spleen. The constitutional symptoms are characteristic. One or another of the forms of ague, and impairment of the quality of the blood, with leukæmia and anæmia, will generally serve to identify this lesion. Physical exploration of the abdomen and of the pelvic organs will help to settle the question, but in rare cases it cannot be done without a resort to the exploratory incision.

From Uterine and Ovarian Cancer.—We can never know absolutely if ovarian dropsy is or is not complicated with cancer until the abdomen has been opened, but there are signs that will help to distinguish between them in ordinary cases. It is rare for ovarian cystoma to undergo a course of development in which after some years the upper outline of the tumor would not extend beyond the umbilicus. The more decided the anchorage of the tumor, and the more frequent the attacks of coincident peritonitis, the more likely is it to be malignant. The same is true of an accompanying ascites, with anasarca of the abdominal integument. The development of the cancerous cachexia with the change in the hue of the skin are pathognomonic.

From Renal Cysts and Floating Kidney.—The only form of renal cyst that resémbles an ovarian tumor of considerable size is the sac in exceptional cases of hydronephrosis. The fluid contained in such a tumor of the kidney has been known to reach thirty pounds. That fluid is characteristic in that it always contains urine of a more or less altered character, with or without pus and albumin.

Hydatid and serous cysts of the kidney could only be confounded with small commencing ovarian cystoma. Tapping with a fine aspirator-trocar would settle the diagnosis in either case. In all renal growths the tumor develops from above downwards, and is movable in the direction of its natural point of attachment. The latter rule applies especially to the recognition of the migratory kidney, which, in cases cited by Atlee and others, has frequently been mistaken for a small ovarian cyst.

From Tumors caused by Retention of the Menses or of Fæcal Matter.—Menstrual accumulation is referable to obliteration of the uterine cervix or to atresia of the vagina, and when the mechanical obstruction is overcome its recognition is easy. The character of the discharge would also be significant.

Fæcal tumors are hard, irregular, and nodulated, painless, and removable by enemata of oil, castile suds, or some similar solvent. In large and long-lasting fæcal tumors the sallow, dirty, copræmic hue of the skin is very apt to be present.

Treatment.—The treatment of ovarian dropsy is either medical or surgical. Whether the cysts are primary or secondary, simple or compound, benign or malignant, the practical question is if remedies alone will cure them, or if we must depend upon the knife to get rid of them. Some of our physicians claim that medicines, if properly chosen, are amply sufficient; while others regard them as nearly or quite powerless in this case, and consequently insist that surgical means are the most expedient and reliable.

The Medical Treatment.—No one claims to have found a specific for these cystic growths, but the following are the remedies that have been prescribed on various symptomatic indications.

Apis mellifica.—In a paper read before the Pennsylvania State Homœopathic Medical Society, October, 1877, Dr. H. N. Guernsey says: "In Raue's *Annual Record* for 1870, page 70, is the first case on record, so far as I know, and it was a cure effected by myself nearly twenty years ago. The case came into my hands after it was pronounced by several of our best allopathic physicians and surgeons to be a well-developed instance of ovarian dropsy, which nothing but the knife would relieve. The fear of so formidable an operation induced her to seek my aid. The tumor was so large as to fill the entire abdominal cavity, rendering stooping impossible. There was also an anasarcous condition of the cellular tissues throughout the whole body. The characteristic symptoms indicating the remedy were *pains like bee-stings* in the ovarian cyst, very scanty urine, and *no* thirst. By administering *Apis mel.* in strict conformity with our Law of Cure, in the course of ten months she was restored to perfect health. A few months after the cure she was found to be pregnant, and in due time gave birth to a healthy child."

Other cases believed to have been cured by the same remedy are reported by Dr. A. E. Small (Raue's *Record*, 1873, p. 173); Dr. P. H. Hale (Raue's *Record* for 1872, p. 173); Dr. A. M. Piersons (*N. A. Journal of Hom.*, xxi., p. 553); Dr. C. Wesselhoeft (*Hahnemannian Monthly*, ii., p. 184); Dr. J. H. Payne (*ibid.*, p. 50); and by Dr. William Tod Helmuth (*Trans. World's Homœopathic Convention*, vol. ii., p. 675).

Belladonna.—Dr. H. N. Guernsey (*Hahn. Monthly*, December, 1877) says: "Another marked case comes to my mind, which I cured several years ago. The tumor was as large as the head of a new-born child at full term, situated in the right ovarian region, and was caused by falling over a wash-tub. There was pain at every menstrual period, terribly forcing and bearing down, as though everything would issue at the vulva. This case was cured perfectly and completely after six months, by *Belladonna* given at every menstrual period."

Calcarea carbonica.—Dr. Charles Sumner (*Trans. N. Y. Hom. Med. Society*, vol. ix., p. 312) cites a cure with this remedy in the sixth potency, the patient having taken it for the space of one year; and Dr. Guernsey (*op. citat.*), another in which the Calc. carb. was followed by *Sepia* with a perfect result.

Colocynth.—With his accustomed caution, the late Dr Carroll Dunham (*N. England Med. Gazette*, vol. iv., p. 311) reports a case that dates to October 10th, 1864, as cured by this remedy. But the diagnosis was faulty, and he evidently felt it to be so, for he closes his report with the suggestive inquiry, "Was this really an ovarian tumor?"

Graphites.—Dr. R. E. Dudgeon (*British Journal of Homœopathy*, 1873, p. 187) reports a case of this kind cured by Graphites.

Kali bromidum.—Dr. Richard Hughes, in the same journal for 1872, p. 793, cites a cure of ovarian dropsy by this preparation of Kali. Afterwards, the abdomen seemed filled with fluid, which was entirely removed by *Apocynum*, *Arsenicum*, and *Apis mellifica*. But the innocuous character of this fluid is pretty good proof that the case must either have been one of encysted peritoneal dropsy, or a cyst of the broad ligament, both of which have been many times mistaken for ovarian dropsy.

Platina.—Much stress has been laid by some physicians upon Dr. Mercy B. Jackson's reported cures with this remedy. The reader will find the three cases in the *North American Journal of Homœopathy* for August, 1873, at page 90. The doctor does not claim that they were cases of ovarian dropsy, and evidently they were not.

Podophyllum peltatum.—In the year 1857, and again in 1869, Dr. William Gallupe reported to the American Institute (*vide Trans.* for those years) the cure of two ovarian tumors, the first in the right side, and the second in the left one, in which the persistent use of this remedy seemed effectual.

Other cures of ovarian tumors by internal medication are reported in our periodical literature; but in most of them it is not stated whether the tumors were cystic, solid, or composite; many of them were treated years ago, when the means of diagnosis were much less perfect than at the present time; and in many of them so much time was consumed in the treatment, and so many remedies were given, one after another, as to render them of little value. Perhaps the most remarkable cure of this kind is that furnished by Dr. J. G. Baldwin (Helmuth's *Surgery*, 3d edition, p. 919), in which the tumor occurred during two successive pregnancies, was thrice tapped, and finally disappeared under *Iodine*^{3}.

The fact is, that whatever we may, and really do, accomplish in the treatment of ovarian enlargement from other causes than cystic degeneration, this special form of disease has not proved as amenable to internal medication as we could have desired. The therapeutics of genuine, unmistakable ovarian dropsy awaits development.

The *surgical treatment* of this localized form of dropsy includes the use of electricity, the resort to the tapping, drainage, and injection of the cyst, and to its removal by ovariotomy.

Concerning the cure of genuine ovarian dropsy by electricity, recent developments in diagnosis are very significant and suggestive. It is more than possible that whenever abdominal tumors containing a fluid have been disposed of in this way, the cyst has been unilocular, and of the sort that get well with one or more tappings, or from bursting, and the resorption of their harmless contents. Hence the proposal of a shrewd but unscrupulous electrician to cure these dropsical tumors by electrolysis, just as he would a case of hydrocele, if upon tapping the cyst with a hypodermic syringe he can first obtain a limpid, colorless fluid like water. He would thus recognize the difference between such a tumor (which evidently is located in the broad ligament, the Fallopian tube, the parovarium, or in a peritoneal compartment), and a *bona fide* case of follicular ovarian dropsy.

Without discussing this subject, it is proper to say that, knowing the poisonous contents of a fully-developed and undoubted cyst of the ovary, whether it was simple or compound, no careful and responsible physician would consent to puncture it with an electrical needle; nor would such a physician, in such a case, seriously promise to stimulate the absorbents and secure its removal by any other form of electrical manipulation.

Tapping and drainage were much more popular a few years ago than they are at present. Indeed, there is not a prominent author to be found among our modern writers who would recommend the seton or caustics, or the removal of the contained fluid, if it were dense and glairy, and the subsequent injection of an ovarian cystoma with any irritating substance whatever in the hope of a radical cure. Tapping, as we have already said, is sometimes necessary for diagnostic purposes, and it may be a last resource in extreme cases where ovariotomy is not practicable for the temporary relief that it brings; but the attempt to promote adhesive inflammation by throwing iodine, brandy, red wine, solutions of the acid nitrate of mercury, of caustic potash, of the nitrate of silver, or the tincture of cantharides or of camphor into the sac, especially if it be a compound one, is risky and futile.

The best showing ever made for this plan of treatment was made by Boinet who, in 1847, first practiced the injection of the compound tincture of iodine into abdominal cysts in the same manner that Velpeau had resorted to it for the cure of hydrocele in 1839. Of his first series of 100 cases, Boinet cured 62 and lost 38. Of these, 58 were single cysts, and 42 were polycysts, which, in a period of doubtful diagnosis, and with the most favorable construction that we can put upon his tables, counts only a very small per cent. of cures in the case of compound cysts.[*]

"To-day, being better informed concerning the nature of the cysts that are curable by iodine injections, we employ those injections only in cysts in which the chances of cure are almost certain, *id est*, in simple unilocular cysts which contain a serous fluid. . . . Thus, since we have reserved this plan of treatment for simple monocysts containing a clear serum, or a hydatid or purulent fluid, our proportion of cures has increased to 81 per cent."[†]

In a word, we now know that the only unilocular cysts of the ovary proper are those in which the partition walls of a compound cyst have given way, leaving a single cavity as well as a single envelope for the tumor. All other monocysts that have attained a considerable size *are not ovarian*, and *should neither be classified nor treated as such.*

Incision of the cyst-wall, and subsequent drainage, except in single suppurating cysts, is a slow, uncertain, and unsatisfactory method of treatment. Nor is anything to be gained by cutting away a portion of the cyst-wall, as in excising a strip of the tunica vaginalis for the radical cure of hydrocele.

Ovariotomy.—From the year 1809, when Dr. Ephraim McDowell, of Kentucky, made the first ovariotomy, until the present time, this operation has met with serious opposition on the part of some prominent surgeons and physicians. It has, however, survived the last organized obstacle to its performance in which, as late as 1858, it was proscribed by the French Academy of Medicine as both murderous and barbarous. In consequence of increased skill, care, and experience, it has come to be recognized as one of the capital operations that are both expedient and justifiable for the relief of suffering and the prolongation of life.

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[*] Traité d'Idothérapie, page 664.

[†] Boinet, Traité pratique des Maladies des Ovaries et de leur Traitement, etc., pp. 472-473.

In resorting to so serious a means of relief, the first thing to do is to determine whether the case in question is a suitable one, and whether the operation is indicated or contra-indicated. It is always indicated when the milder means have not been successful; when the tumor is growing rapidly, and when the patient's strength and vitality are failing; when she is wakeful and irritable, loses her appetite and courage, or suffers from dropsy of the extremities, from septic diarrhœa, from dragging, and the weight of the tumor; from dyspnœa on exercise, or upon lying down; and from extreme distension of the abdomen.

Ovariotomy is peremptorily indicated in case of the sudden rupture of a compound cyst of the ovary with extravasation of its contents into the peritoneal cavity; upon the discovery of pus or of blood in the tumor; and for the relief of symptoms of strangulation of the tumor by a twisting of its pedicle. It should be practiced even during pregnancy, when it becomes manifest that the developing uterus is almost certain to fracture the cyst, and thus to imperil and destroy the woman's life before term.

A few years ago, the most prominent contra-indication for ovariotomy was the existence of extensive adhesions between the tumor and the parietes of the abdomen, or to the neighboring organs. At present, although these adhesions do certainly lessen the chances of recovery, they do not constitute a bar to the operation. The only exception to this rule is in cases that are cancerous, and in them ovariotomy should not be undertaken. But even here we must not decide upon a mere suspicion of malignancy of the tumor.

The rapid development of tuberculosis, of Bright's disease, of organic affections of the heart or the liver, tubercular peritonitis, ulceration of the stomach and the bowels, would also prohibit the resort to so serious an operation. Care should, however, be taken not to conclude that a coincident or consequent emaciation signifies that the patient is suffering from a form of phthisis, for in the advanced stage of the ovarian dyscrasia women always lose flesh, and sometimes to a surprising degree.

Nor is albuminuria a certain sign of desquamative nephritis; and, therefore, unless there is better evidence of organic disease of the kidneys than its presence alone affords, the operation might proceed. Valvular lesions of the heart must be serious if they are allowed to stand in the way. I have, several times and successfully, operated upon patients who were afflicted with valvular disease, without any serious risk from this cause. Such patients should inhale sulphuric ether, which is a cardiac stimulant, and it should be given very carefully, especially at the first.

If there is reason to believe that the gastric, or the gastro-intestinal, disorder depends upon septic absorption from the tumor, the sooner that tumor is removed the better. But, if such a patient has been in the habit of taking morphine very largely, she will not be a promising subject for ovariotomy.

It should be remembered, however, that the rules governing the choice of suitable subjects for ovariotomy are not fixed and unvarying. For, not only have some of the most desperate and unpromising cases finally recovered from it, but the progress in abdominal surgery is such that the list of contra-indications for its employment is shrinking very rapidly. It will never be a safe operation when rashly or indiscriminately made, but in the hands of an experienced and responsible ovariotomist, its range of application and its rate of success are likely to increase.

This formidable operation should not, however, be made during the prevalence of a very severe epidemic, as of diphtheria, variola, erysipelas, or of the puerperal diseases. It may be performed at any season of the year, but is most successful in the spring and autumn. It should not be practiced either directly before or during the menstrual period.

For reasons that were theoretical and humane rather than practical, the early ovariotomists advised waiting until the cyst or cysts were fully developed, and the patient's health was seriously and dangerously involved before the operation should be undertaken. Further experience has shown that this counsel increased the mortality from ovariotomy when it was finally made. It is safe to say that the following reasons, given by Dr. Bantock, for an early resort to this expedient are sound and satisfactory. He says:*

1. We should not wait until the patient's general health has become impaired, or in other words, the principle of such a delay is a departure from that generally followed in the case of other diseases treated surgically.

2. The presence of the tumor is the cause of structural disease of other organs.

3. Ovarian tumors are liable to a variety of accidents, such as rupture, either from injury or spontaneously, and twisting of the pedicle, to morbid processes, such as inflammation, atheromatous degeneration of the bloodvessels, which, with fatty change in the walls of the cysts, leads to hæmorrhages into their interior, etc.

4. The existence of adhesions, of degenerative changes in, and rup-

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* A Plea for Early Ovariotomy, by G. Granville Bantock, M.D., etc., London, 1881.

ture, etc., of the tumor, greatly interferes with the success of the operation.

5. On the contrary, the earlier and simpler the operation, the greater is the chance of recovery.

These points will interest the general practitioner who, although not a specialist, will certainly be called upon to consider whether and wherefore any kind of surgical treatment is necessary for the cure of ovarian dropsy. But it is not within the province of this volume to treat of the method of performing ovariotomy, for the details of which the reader is referred to the appended list of accepted authorities.*

The after-treatment is next in importance to the operation itself. The reaction will vary with the degree of shock, the loss of blood, and the strength and vigor of the patient. In exceptional cases the anæsthetic has a very depressing effect, more especially when it gives rise to nausea and vomiting and to loss of sleep. If the ether has caused this trouble, its effects should be counteracted by the inhalation of spirits of camphor, or of ammonia, by teaspoonful doses frequently given of a mixture of three or four drops of aqua ammonia in half a glass of water; or by hypodermic injections of clear whiskey. In very weak subjects these injections may be repeated until there is an ability to take and retain the proper food. There is no doubt that they have saved life.

If the vomiting is persistent, she must avoid cold water and ice, if possible, but may have a spoonful, or two only, of hot tea or of hot milk-and-water now and then. The most absolute rule in this regard may need to be enjoined and enforced, more especially if the patient is being nursed by a sympathetic friend or relative. Ipecacuanha, Mercurius, Nux vomica, Veratrum alb., or kindred remedies may be called for on every-day indications. For the relief of an incidental colic, Chamomilla or Colocynth is often of the greatest service. These remedies not only relieve pain, but also promote the passage of flatus, after which the stomach becomes less irritable and begins to demand as well as to tolerate food. As soon as it is proper, these patients should be well nourished with milk, rich broths, eggs, and soups.

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* PEASLEE: Ovarian Tumors; their Pathology, Diagnosis, and Treatment, especially by Ovariotomy, 1872.

W. L. ATLEE: General and Differential Diagnosis of Ovarian Tumors, with special reference to the operation of Ovariotomy, 1873.

BOINET: Traité Pratique des Maladies des Ovaires, etc., Paris, 1877.

WM. TOD HELMUTH: A System of Surgery, 3d edition, 1879.

KOEBERLÉ: Nouveau Dictionnaire de Médecine et de Chirurgie Pratiques, tome 25, p. 560.

EMMET: Principles and Practice of Gynecology, 1879.

LEBLOND: Traité Elementaire de Chirurgie Gynécologique, Paris, 1878.

T. GAILLARD THOMAS: Diseases of Women, 1880.

LUDLAM: Diseases of Women, 5th edition, 1881.

T. SPENCER WELLS: On Ovarian and Uterine Tumors, 1882.

A. W. EDIS: Diseases of Women, 1882.

LAWSON TAIT: Pathology and Treatment of the Diseases of the Ovaries, 4th edition, 1883.

As in puerperal cases, after a difficult labor, the prescription of Aconite and Arnica in alternation is a good one for the relief of the fever and traumatism. As an index of reaction and of the patient's strength, as well as affording the first rational sign of peritonitis whenever it occurs, the pulse should be carefully watched and recorded. The temperature should be taken morning and evening, and any symptoms which it may give of a complicating infection, whether putrid or purulent, taken at its proper valuation.

Great care is necessary that the patient shall not be chilled. For this reason the temperature of the room in cold weather should be kept as uniform as possible. It should not be below 70° F. until the first four days have passed. The room should be ventilated, if possible, by the constant admission, day and night, of fresh, outside air through the hall or an adjoining room.

For the first few days the urine should be drawn every three or six hours. If there is a free passage of flatus, the bowels need not be disturbed before the fourth or the fifth day, when they may be opened by a careful enema. A slight diarrhœa, especially if it follows a high temperature, may be a safety-valve for sepsis, and therefore salutary. But if it continues, and grows more copious and exhausting, it should be relieved by Arsenicum, Veratrum, Phosphoric acid, or a kindred remedy.

It is very important to keep the patient quiet. Neighbors and visitors should all be excluded until she is able to sit up and receive them singly. At the end of a week, or perhaps sooner, in exceptional cases, she may be turned in bed partially, upon one side, and a pillow placed behind to steady her for a little, now and then.

If the wound has been closed completely and the pedicle dropped within, the dressings may not need to be disturbed for several days.

It should, however, be looked at carefully at intervals to be certain that union is taking place and all is going on well. At the first appearance of pus, it must be washed and disinfected with calendula-water to which a few drops of carbolic acid or a little borax or glycerine are added. This dressing may afterwards need to be repeated two or three times a day. In most cases, it is very well to place a compress wet with the same solution over the wound and leave it there.

Unless there is some pus along the track of the sutures they should not be removed before the eighth to the tenth day. It is a good plan to take out the upper ones a day or two before the others are removed. The adhesive straps should be continued for a week or two after the sutures are withdrawn; and the binder, or an abdominal supporter, should be worn for six months after the operation. Directions for flushing the abdomen, and for the resort to extraordinary measures in extreme cases, will be found in the books to which we have already referred.

II. *Dermoid or Cutaneous Cysts of the Ovary.*

Clinical History.—Excepting the pure fibroid, this is the rarest form of ovarian tumors. Its chief peculiarity is found in the varied contents of the cyst or cysts, for it may be compound, and may affect one or both ovaries.

These tumors usually contain a fluid, but it is seldom present in large quantity. Within this fluid we find, floating or fixed, such foreign bodies as hair, teeth (of the bicuspid variety if numerous, and of the canine if not), flat bony plates and spiculæ, bits of bone resembling the alveolar process with teeth in them, or rudimentary teeth set in cartilage, finger-nails, skin with its component parts, and vessels filled with morbid deposits or sebaceous secretions, striped muscular fibres and nerve-tissue, scales of cholesterine, fat in considerable quantity, which may be as firm as lard or tallow or oily, or so beaten up as to resemble old butter or a pomade. Besides these curious products, which were formerly regarded as belonging to the domain of the wonderful, there is pus which may have collected in large quantity, and which has sometimes been removed in similar cases without giving rise to the suspicion of a dermoid cyst. If the pus is absent, it may have been replaced by a putty-like material resembling Chinese-white.

It is evident, therefore, that these tumors may be single or double, simple or compound. In most cases they may be carried for years without seriously compromising the health or life of the patient; but their ultimate tendency is to become malignant. Their tissues are quasi-cancerous, and their connective tissue especially is prone to undergo sarcomatous degeneration.

These tumors may exist in infancy, and even in the fœtus in utero; they are most frequent in young women, but are rarely seen in those who are past forty. Doran, however, cites a case in a woman aged sixty-three; and Atlee reports a dermoid cyst of the ovary, entirely devoid of a pedicle, in an unmarried lady aged seventy-nine years, and who had carried the tumor for forty-seven years. They are almost always, if not always, congenital, the common course being to remain in an undeveloped condition through childhood until about the period of puberty. Sometimes the occurrence of pregnancy stimulates their growth, after which they may give rise to trouble through pressure upon the neighboring parts. It is only, however, when the tumor is solid, or when its walls are thick and firm, that it causes any considerable pain or discomfort.

These dermal cysts seldom attain a very large size, are of comparatively slow growth, and are almost never seen in negro women.* When they are partly cystic and partly solid, or mixed, the parent sac may develop so as to fill the abdomen, the same as in the non-piliferous tumor. A single compartment of a compound dermal cyst of the ovary may contain such a curious collection of products as has been named, while the remaining sacs are filled with the proper ovarian fluid. It is not very unusual to find some of them lodged in the cyst-wall of multilocular tumors of the ovary.

Ætiology.—These peculiar tumors "were in times past looked upon as inexplicable marvels, and not only had their entry into museums as treasures, but were described with scrupulous verbosity. There is, however, nothing more extraordinary in them than in the appearance of bone in the gluteus, or imperfect brain-like matter in the substance of the mammary gland, or fibrous nodules in the lobes of the cerebrum. Their chief surgical interest is in the obscurity they throw over diagnosis, and in the complications they occasion." (*Spencer Wells.*)

Various theories have been proposed in explanation of the origin of these cutaneous tumors of the ovary. The most popular was that of fœtal inclusion, a *fœtus within a fœtus*, which referred them to the blighting of a twin-fœtus and its inclosure within the ovary of its mate, while the latter underwent the proper development and came to maturity. Another idea was that the contained morbid products could only have resulted from the impregnation of the patient; or, in other words, that a dermoid cyst of the ovary was of necessity the result of an extra-uterine pregnancy. A third was that of parthenogenesis, or the development of an ovum without impregnation; and a fourth referred to incomplete embryonic development of the epithelial cells of the ovary itself. But such speculations are fanciful and not profitable. The conclusion of a recent writer on this subject commends itself: "I think the best solution of the question is that of the invagination of the blastodermic membrane, the external layer of which develops the organs of animal life. If, therefore, there should be an inclosure of any part of this membrane within any organ of the body, these epidermal formations would readily be produced." (*Helmuth.*) "The dermoid ovarian cyst question appears to me to be closely and inseparably linked with some of the most profound mysteries of organic life." (*Doran.*)

Diagnosis.—The fact that these dermal tumors may be carried for a long time without any very decided impairment of the general health, and without attaining any great size, as well as their firmness and solidity when their wall is thick and when they are filled with solid or with semi-solid contents, has frequently caused them to be mistaken for uterine fibroids. Unless there is inflammation in some of their structures, or pressure by them upon the neighboring organs, both these kinds of tumor are insensible and painless, of slow growth and innocuous, and both may undergo cystic or sarcomatous degeneration. But there are, however, a few points which may serve to differentiate them. With the fibroid growth there is a history of a coincident menorrhagia; the tumor has very little tendency to anchor itself through inflammation of its capsule or of its investing peritoneum; and it is very rare indeed for it to undergo the process of suppuration. On the contrary, the dermal cyst is seldom accompanied by a profuse menstruation; it almost always becomes immobile through adhesive inflammation; and it is very prone to suppurate. Most uterine fibroids which have attained a considerable size grow decidedly larger with the return of the monthly period, and afterwards diminish with the decline of the flow, which is not true of these cutaneous cysts. Although it may be present, ascites is not a common accompaniment of uterine fibroids, while it is almost never absent in a dermoid cyst of the ovary which is large enough to claim our professional attention. When the dermoid cyst is located either in the posterior or anterior cul-de-sac, or anywhere at the root of the vagina where it is accessible to the touch, there is almost always a perceptible fluctuation. This is not true of uterine fibroids.

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* Concerning the remarkable exemption of the negro race from ovarian cystomata Dr. Atlee says: "I may here state as a remarkable fact, that out of two hundred and fifty-five operations performed by me for the removal of the ovary, only one was performed on the negro, and that a mulatto, notwithstanding I have been frequently consulted by that class for abdominal and pelvic tumors."—*General and Differential Diagnosis of Ovarian Tumors, etc.*, 1873, p. 192.

When these clinical points are not sufficient to enable us to decide between them, it may be expedient to resort to tapping by the aspirator-needle, the careful introduction of which will help to determine whether it has passed into a sac or into a solid growth; while, if any fluid is withdrawn, it may serve to settle the character of its contents. If the fluid contains hair or epidermal scales, or if it resembles candle-grease or melted butter after you have forced it from the barrel of the instrument into a glass, and especially if it solidifies so that you can turn the glass upside down without spilling it, and dissolves again by placing the glass in warm water, the diagnosis is clear. (*Laroyenne.*)

The reduction in the size of the tumor by this species of tapping, and the facility with which it refills, are characteristic and confirmatory. It is important to remember that if the needle strikes upon a bony structure, or even if bits of bone, teeth, and the like, are discharged through fistulous openings in the rectum, the vagina, the bladder, or the abdominal parietes, the case is not necessarily one of extra-uterine pregnancy. Mistakes of this kind have often been made, and have sometimes given rise to social unhappiness when it should have been prevented.

Since a dermal growth may be composite, and may have one or more cysts which contain a proper ovarian fluid, and since one ovary may be the seat of such a growth while the opposite one has undergone the ordinary cystic degeneration, the mere removal of a quantity of ovarian fluid by tapping does not preclude the possibility of a dermoid cyst. In these cases the diagnosis must be settled by the exploratory incision or by ovariotomy.

Prognosis.—The younger the subject and the smaller the tumor, especially if it has not been tapped or tampered with by injections or setons, the better the chances for recovery under proper treatment.

Pregnancy and puerperality increase the risks of the case; and so also do prolonged nursing, and the cachexiæ arising from the abuse of drugs, from malaria, and diabetes mellitus. The more extensive the parietal adhesions of the tumor, the larger the amount and the more vitiated the quality of the pus contained within it, the less likely is the patient to recover from an operation for its removal. Suppurating cysts of this kind, particularly if they have fistulous openings, may drain away the strength and destroy life. If one of the fluid compartments of the tumor shall burst and discharge itself into the cavity of the peritoneum, death may ensue from septic infection. Cancerous degeneration of the connective tissue in an old dermal cyst may be followed by constitutional involvement and fatal consequences. Even the tapping of other cysts in the neighborhood may complicate the case, and will call for a guarded prognosis.

Treatment.—The spontaneous cures that have been effected by Nature have encouraged some of our physicians to hope for relief in this way, and to recommend an expectant and palliative treatment for these tumors. But it is only when more active measures are contra-indicated that this course is the safest and best. Whenever it is expedient, extirpation is the remedy. And, since the worst adhesions and complications are so well managed at the present time, since the risks of infection may be so easily overcome, and both the operation and the after-treatment have been so perfected in detail, even the least promising cases may make a good recovery.

There are two reasons for a resort to ovariotomy which we have sometimes urged in cases of this kind: (1) that the operation may be made with comparative safety in little girls, or infants, if necessary;* (2) that if it is made at an early period, before any sarcomatous or colloid degeneration has taken place, these tumors are not more likely to recur than the ordinary ovarian cystomata. But, like solid tumors of the ovary, these growths should be handled very carefully, and if possible only by those who are practically familiar with ovariotomy.

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* *Vide* the American Journal of Obstetrics for July, 1882, page 625, and the London Medical Record for June, 1884.

If the cyst suppurates, and an abscess points externally, or into the vagina, it may require to be punctured and discharged; or, if the orifice which has formed spontaneously is not sufficient, it must be enlarged so that the fluid contents of the tumor may escape. Where we cannot do any better, the remaining contents, bones, teeth, balls of hair, etc., should be carefully removed, and the cavity of the tumor washed out with an antiseptic preparation. Meanwhile the patient should be kept under the influence of good diet and of constitutional remedies, such as Silicea, Hepar sulphur., etc.

III. *Fibroid Tumors of the Ovary.*

Clinical History.—The clinical history of ovarian fibromata is involved in some obscurity. The comparative scarcity of fibrous tissue in the ovary, and the rarity of these tumors, have occasioned a doubt in the minds of some authors as to their existence; for some insist that the so-called fibroids are modified forms of cancer, and others that they are mixed sarcoma, with a tendency to cystic, calcareous, or possibly to a purulent, degeneration. There is little doubt that, in certain cases, chronic inflammation of the ovary may result in a complete disappearance of its Graafian follicles and in a fibroid degeneration of its stroma. This condition may extend to the proper fibrous covering of the organ, the *tunica albuginea*, and the resulting tumor becomes fibrous throughout.

Certain characteristics of fibroid growths within the pelvis and the abdomen are not lacking in ovarian fibroids. They are of slow growth, spherical, painless, or nearly so, accompanied by menorrhagia, and tend to undergo one of the forms of degeneration already mentioned. One point of difference between them, however, is that they are not always so mobile as uterine fibroids; and another peculiarity is that they are less apt to become pedunculated.

"The cases which have been reported of fibroma affecting both the ovaries are extremely few. Solid tumors of both ovaries are, for the most part, either sarcomatous or carcinomatous in their character. Out of twenty cases collected and tabulated by Leopold in his elaborate and able paper on solid tumors of the ovary, ten are described as carcinomata, seven as sarcomata, and three as fibroid. On reference to the original authorities it becomes evident that at least two out of the three cases in this last group ought scarcely to have been classed as fibroids, and that the fibroid character of even the third case rests on but a slender foundation."*

Rare as they are, it almost never happens that a purely white fibroid of the ovary attains any considerable size. The larger it is, the more likely is it to have taken on some new form of development, or to be in some way dependent upon the uterus for its extraordinary volume.

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* Mr. Cullingworth, On Fibroma of Both Ovaries, Trans. of the Obstetrical Society of London, vol. xxi., page 285; for a remarkable case of calcifying fibroma of the ovary, see the same Trans., xxv., page 35.

Ætiology.—These growths may sometimes be traceable to chronic ovaritis, to a traumatic injury from a fall, a blow upon the abdomen, to intra-ovarian or extra-ovarian hæmorrhage, to pelvic hæmatocele, or to a coincident cancer of the mammary glands, the stomach, or the liver.

Diagnosis.—It is only when they are large that their diagnosis can be made out with any degree of certainty; and even then it is not always possible. Naturally enough, they are more likely to be confounded with uterine fibroids than with any other kind of pelvic or abdominal tumor; and the difficulty is increased in proportion with their tendency to become displaced or to grow toward the mesian line. The best diagnostic marks, when we can get them, are the independent mobility of the uterus and a lack of the increased depth of that organ which is generally found, even in the case of sub-peritoneal uterine fibroids. Another symptom which is significant is that ovarian fibroids are much more apt to be accompanied by an ascitic accumulation than the uterine variety, while they are much less likely to develop a pedicle of their own, or to detach themselves from all connection with the parent organ.

Prognosis.—So long as a fibroid of the ovary remains spherical in form and mobile, without any considerable ascitic accumulation, pain, or rapid increase of size, it is safe to conclude that it is benign in character, and that it will be practically harmless if we let it alone. But if its outline becomes irregular, or if it becomes anchored, with an ascitic accumulation, increased suffering from intra-pelvic pain and neuralgia, or if it begins to grow more rapidly than before, and to develop a cachexia, it is already undergoing a cystic, a sarcomatous, or a cancerous degeneration. In general it is a favorable sign if but one ovary is involved.

Treatment.—Circumstances favor the idea that this class of ovarian tumors may sometimes be disposed of by internal remedies when they are properly and persistently applied. The slow rate of their growth, the slight degree of constitutional involvement, excepting in old and bad cases, and the fact that they do sometimes disappear spontaneously, are so many arguments for the employment of remedies with the ultimate hope of arresting their further development, if not of disposing of them altogether. But, as yet, our clinical experience does not confirm this theory to its fullest extent. Such cases are rare, and there is not on record a well-authenticated case that has been cured by a single remedy. The subjective and the clinical indications are being slowly evolved, and each physician who treats an ovarian fibroid of this sort will need to find them and to apply them as best he may, until we have more therapeutic light upon the subject.

Calcarea phos., Secale corn., Calcarea iod., Iodum, Kali iod., Mercurius corr., and Macrotin have been more frequently given, and with apparently good results in favorable cases, than any other remedies. The class of indications upon which they should be chosen are most prominently such symptoms as are dependent upon the involvement of the menstrual function, pregnancy, sterility, parturition, and lactation, the intra-pelvic distress, constipation, intestinal indigestion, and hæmorrhoidal conditions, and the constitutional dyscrasia upon which the tumor may be engrafted, or of which it is the outgrowth.

Other resources that may be advisable or necessary are electricity (but not electrolysis), the hypodermic use of Ergot, and ovariotomy. That the Secale, when injected beneath the integument, and not into the tumor, for fear of sloughing, will sometimes cause these extra-uterine fibromata to shrink and to disappear, there can be no doubt. Its use in this manner is especially required if, in connection with the ovarian fibroid, there is menorrhagia from subinvolution of the uterus, or if the patient is of a hæmorrhagic diathesis.*

Ovariotomy is indicated when the signs of degeneration of the growth are evident, and when complications ensue that are necessarily of a fatal character if they are allowed to continue and to increase. But, however skilfully it may be performed, and even under the most favorable conditions, it should be borne in mind that comparatively few of these cases recover. For, as a rule, it is safer, all things considered, to remove an ovarian cystoma weighing forty to sixty pounds than to extirpate an ovarian fibroma as large as one's first. If all the fatal cases of ovariotomy for this class of fibroids were faithfully reported, the list would be a large one; and yet, as a *dernier ressort*, it may and should be practiced in some of these cases.

IV. *Malignant Tumors of the Ovary.*

Under this head are included several varieties of morbid growth which, although differing in themselves, have certain clinical features in common. They are nearly all composite, or partly solid and partly cystic; but in some of them the cyst is developed first and the solid portion afterwards, while the opposite is true in other cases. In some the primary sac disappears in order that the morbid growth may have more space in which to develop. In all of them the tumor is very apt to be the first sign afforded of a tendency to malignant disease.

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* The best preparation of this drug for hypodermic use is that made by Professor G. C. Wheeler, of Chicago, which represents one grain to the minim, and is not in the least degree irritating to the tissues.—R. L.

1. *Cysto-sarcoma of the Ovary.*—Certain peculiarities attach to this form of ovarian tumor. The comparative slowness of its growth; the fact that both ovaries are almost always involved; the size of its cyst or cysts, which are sometimes very large; its disposition to mass the womb with the tumor: the irregular shape of its solid portion, and its proneness to recur after removal if the patient survives the operation, are so many points of clinical interest and study.

Some of these tumors have a clinical history that is puzzling to the last degree. In the month of February, 1885, a case of this kind was sent by Dr. Kanouse, of Wisconsin, to the Hahnemann Hospital of Chicago. The following are the details of the case:

CASE.—Mrs. ——, married, aged forty-six, has conceived only once, which occurred twenty years ago. The child was still-born. She enjoyed comparatively good health until fourteeen years ago, when an enlargement was observed in the left ovarian region. This enlargement grew slowly for a period of five years, giving rise to no special inconvenience. The abdomen had attained a circumference of between thirty-six and thirty-nine inches when she received a fall, soon after which the abdominal enlargement diminished. From this sudden disppearance of the tumor it was supposed that it must have been ruptured by the fall. No perceptible discharge occurred, neither did the patient suffer any special shock or inconvenience, saving a slight weakness for a few days.

Following this accident an enlargement appeared in the right ovarian region, developing quite rapidly for eighteen months, when it also was ruptured spontaneously. At this time a very small quantity of a thin, inoffensive fluid escaped per vaginam.

This sac apparently refilled, and in one year more ruptured again, the abdomen decreasing in measurement, within about twenty-four hours, from a circumference of forty-one to twenty-two inches. At this time there was a clear, inoffensive, syrupy exhalation from the skin, necessitating a constant sponging of the patient for three days and nights, and then it gradually disappeared. No serious illness followed, and the patient was about as usual after a lapse of ten or twelve days

But this did not end her trouble, for soon after it was noticed that the tumor was again developing. The progress of this growth has been very much slower than that of the preceding two, having covered a space of six years in attaining its present size.

During the last five years the menstrual periods have been very irregular. The flow is copious, dark-colored and clotted, lasting as a rule for ten days, and being accompanied with and preceded by intra-pelvic pain, notalgia, and cephalalgia; and during the past two years the flow has been of an extremely offensive odor. She occasionally has a slight intra-pelvic pain during the inter-menstrual period. The urine is normal; the bowels are constipated; the œdema of the lower limbs is quite marked.

Her mother died at the age of fifty-six of cancer of the womb, and an aunt, her mother's sister, died of some morbid growth of the stomach; but with these exceptions the health of the family seems to have been good.

Physical examination, per vaginam and otherwise, fails to find the whereabouts of the womb, or to detect any fluctuation at the roof of the vagina. Percussion shows that, while on the left side, and transversely below the thorax, the margin of the tumor is rounded, there is a triangular patch of resonance on the right side, the apex of which points across the abdomen, and nearly reaches the mesian line, about half-way between the umbilicus and the pubes.

In a clinical lecture upon this case* tapping was advised as a means of diagnosis for the following reasons: "(1) to avoid the imminent risk of another rupture, for the circumference of the abdomen is thirty-nine and a half instead of forty-one inches; (2) to remove the fluid in order that it may be examined; (3) to get it out of the way of a further physical exploration; (4) to decide whether the tumor is wholly cystic, or if it is composite, and, if possible, to find the whereabouts of the womb; and (5) to enable us to decide intelligently whether, and if so, what further operative treatment is expedient and necessary."

Eleven and a half pints of a chocolate-colored fluid were removed by aspiration, and the patient was put to bed and watched carefully to prevent any serious consequences. Four days later she was brought before the class again, and the diagnosis completed. She was sent home without an operation.

Diagnosis.—The disease with which this form of ovarian tumor is most likely to be confounded is cystic cancer, but careful study will usually serve to differentiate between them. Here is a parallel between their more important symptoms.

OVARIAN CYSTO-SARCOMA.	OVARIAN CYSTO-CARCINOMA.
The rounded outline of the tumor.	The surface of the tumor is irregular and nodulated.
The tumor is not especially sensitive.	It is almost always tender and sensitive.
There is almost always a history of menorrhagia.	Menorrhagia is exceptional.
Almost never a pronounced ascites, or any dropsy of the feet.	Ascites and anasarca are the rule, and not the exception.
The pulse is not habitually rapid.	The pulse is like that of phthisis.
There is no peculiar cachexia.	In a confirmed case the cachexia is always present.
The solid portion of the tumor develops slowly.	The more malignant the solid growth, the more rapid its development.

Fibro-cystic tumors of the uterus have certain peculiarities which are lacking in a case of cysto-sarcoma of the ovary. The menorrhagia that accompanies the former antedates the discovery of the tumor, almost always dating in a more or less marked degree from puberty, being very pronounced after abortion, or from delivery at term, and increasing as time goes on. In the latter, as in the case just cited, the monthly flow may not become excessive until some years after the discovery of the tumor. The fluid drawn from the uterine fibro-cyst lacks the qualities which are peculiar to that from ovarian cyst. It is not sticky, nor are the proper morphological elements contained in it. The relations of the two kinds of tumors to the uterus (when that organ is not imbedded and included in the mass) are very different.

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* Vide the Clinique, vol. vi., p. 89.

2. *Cysto-carcinoma of the Ovary.*—One of the peculiarities of this kind of tumor is that it involves all the ovarian tissues. But, if the Graafian follicles are first attacked or developed, the cystic position of the tumor may attain a considerable size before the stroma suffers and before the solid part can be felt or found. The cancer-cyst is not usually very large, and in this respect differs from the sarcoma-cyst. Its contained fluid is of a depraved quality, and in case of a spontaneous rupture is found to be very poisonous.

If the fibrous and areolar tissues of the ovary are the primary seat of this growth, the hard or solid part of the tumor is the first to be found. Sometimes these indurated growths are carried about for months or years in a kind of innocent way until they suddenly and rapidly undergo a form of degeneration which is due to the involvement of the glandular portion of the organ that has hitherto escaped. When the solid part of the tumor really degenerates, there are pits or compartments within its substance which contain blood or other vitiated fluids. But, whether the solid portion of a cysto-carcinoma of the ovary has come first or last, early or late, its tendency is to involve the uterus and the adjoining structures by a more or less continuous infiltration, and through a low grade of inflammation to glue and bind the neighboring organs in one common mass.

For this latter reason these tumors are more painful than other kinds of ovarian growths. Pains of a neuralgic character across the lower abdomen and about the lumbar and sacral regions, with or without sciatica, are suspicious symptoms when they persist in defiance of well-chosen remedies. This is especially true when there is a large ascitic accumulation, with dropsy of the feet, and a developing cachexia.

Diagnosis.—"Any solid tumor of the ovary will awaken the attention and cause one to suspect the existence of a cancerous growth. This suspicion will be the stronger if both ovaries have been attacked, if the pain is intense, if the development of the tumor has been rapid, if there is a marked degree of ascites, and finally, if the emaciation and the cachexia, and the general and local œdema are out of proportion with the size of the tumor. The age of the patient is also a sign that is worthy of note, for ovarian cancer is generally found in younger persons than is cancer of other organs."*

The differential diagnosis of this form of cancer of the ovary from cysto-sarcoma, with which it is most apt to be confounded, has been given when speaking of the latter.

3. *Scirrhus of the Ovary.*—This is the rarest form of ovarian cancer. It is almost always secondary upon the same lesion in the uterus and the broad ligaments, and while the tumor may sometimes attain a

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* Manuel Pratique des Maladies des Femmes, etc., par le Dr. G. Eustache, Paris, 1881, page 646.

large size, such a result is unfrequent. The form and consistence of the growth, its painlessness and indisposition to attach itself by adhesions to the surrounding organs are distinctive.

4. *Colloid, or Myxoma of the Ovary.*—Properly speaking, the term colloid should be restricted to those tumors which contain a ropy, gelatinous, or jelly-like fluid. For although it has been used to designate a variety of morbid growth, the real lesion of structure found in these tumors is one in which the stroma of the ovary is principally concerned. Its alveolar compartments, in which the colloid product is lodged, and which are not usually of a very large size, are myxomatous. When examined microscopically, a portion of the stroma is found to have undergone a reversion of type towards its original embryonic form.

The idea has been very general that this kind of tumor is of necessity cancerous; but, since it lacks a constant clinical expression, and since some of these cases recover, and do not recur after ovariotomy, it may be doubted whether such a conclusion is always just. The writer has not unfrequently removed ovarian tumors in which one or more of the cysts contained the colloid material, and sometimes in considerable quantity, and yet the patients have gotten well without any recurrence of the affection. But, where the alveolar formation is pronounced, the contents are colloid throughout, and the adhesions about the tumor are firm and extensive, it will be safe to say that the case is malignant.

5. *Papilloma, Epithelioma, and Cauliflower Degeneration of the Ovary.*—Papillary cancer of the ovary may be either extra- or intra-cystic. When the exuberant growths or sprouts are attached to the outer surface of the tumor, they stud its envelope more or less freely, are very friable, and are often found floating in the ascitic fluid that is almost always present in such cases. Secondary papilloma of the cyst-wall, and also of the peritoneum, sometimes results from a rupture of the sac and the escape of its poisonous contents; and it is not unfrequently caused by repeated tapping of a cyst, or cysts, that may have been benign originally.

Epithelioma usually begins within the cyst, and may be limited to its cavity. Before its removal it cannot be recognized or differentiated from other varieties of cancer with any degree of certainty.

In cauliflower degeneration of the ovary, which almost always involves both ovaries at the same time, the growth is exuberant, the ascitic accumulation is very great, and the cancerous cachexia is pronounced. In an advanced stage there is general anasarca with cardiac or renal complication, and a rapid breaking down of the life forces. The remains of a cyst-wall are sometimes, but not always, to be found in the tumor. A remarkable case of this kind, taken from my clinic in the Hahnemann Hospital, of Chicago, will be found recorded and illustrated in the *Homœopathic Journal of Obstetrics and the Diseases of Women and Children* for 1882, vol. iv., page 22.*

6. *Encephaloid of the Ovary.*—The brain-like contents that fill the sac in these tumors is peculiar, and is wholly developed from the lining membrane of the cyst. It is of the same form, consistence, and significance as the encephaloid production when located elsewhere. The course of the disease is comparatively rapid, the peritoneal accumulation is large, and its origin is as often traceable to traumatic as to hereditary influence. It is less likely to involve or to extend to the uterus, and to other neighboring organs and tissues, than is any other form of ovarian cancer.†

Treatment of Malignant Tumors of the Ovary.—Excepting in their incipiency, internal medication is of slight avail in either of these forms of morbid growth. We can fight the dyscrasia and fortify the patient against the encroachments of the disease, but there is no warrant in clinical experience for promising to cure it by any known remedy or remedies. After the general constitutional indications, the menstrual function should be watched, and any tendency to intra-ovarian or other hæmorrhages averted. Very much may be done for the comfort of the patient by the use of Aconite, Belladonna, or Terebinth in attenuation to control the relapsing peritonitis; while Apis mellifica, Bryonia, and other remedies may serve to lessen and, in a measure at least, to control the ascitic effusion.

Two considerations favor a resort to ovariotomy in a certain share of these cases: (1), the fact that the ovary is more isolated than any other organ in the body, and that, therefore, the disease, if it begins there, may be limited to it; and (2), because in the early period of their development, when they are latent and localized, some of these growths are innocent, and their early removal may cure a malignant disease by anticipation. Manifestly, if operative interference is to be successful on a large scale in the treatment of sarcoma, medullary cancer, or the other forms of malignant tumors of the ovary, it must be practiced promptly, and while there is a resonable hope that the neighboring organs and tissues have not yet become involved.

The discouraging features of the case are that the limit within which we may look for and promise a good result is not fixed, but is uncertain; and that, if it could be known, we are not always consulted in season to avail ourselves of it. In most cases in which the gynæcologist especially is called for with a view to ovariotomy, the remarks of the celebrated Kœberlé, of Strasbourg, hold good: "Malignant tumors (medullary, papillary, and scirrhous cancer, enchondroma and melanosis of the ovary) can never be extirpated with the hope of a permanent cure, without local relapse. The adhesion of these tumors to the neighboring parts (the abdominal parietes, the epiploön, the intestines, the womb, the bladder, the vagina, etc.) and the invasion of the ovarian lymphatics, which extend toward the lymphatics of the lumbo-renal region, are usually the points of departure for the production of new cancerous growths. In an advanced stage of the cancerous affection the malignant nature of the ovarian tumor may be suspected, if not actually verified, by the comparatively rapid decline of the general health, the usual signs of the cancerous cachexia, more or less lancinating pains, by ascites, effusion within the pelvis, dropsy of the lower extremities, and the invasion of other organs by the cancerous deposit. If some of these alarming symptoms, which are occasionally present in benign tumors, instead of increasing at the end of a few weeks begin to improve and finally disappear, and if the general condition of the patient's health improves accordingly, the misgivings that we may have had concerning the malignant nature of the affection should be considered as unfounded."*

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* See also the Clinique, vol. iii., page 178.

† The Clinique, vol. iv., page 439.

MENSTRUAL DERANGEMENTS.

BY GEORGE WILLIAM WINTERBURN, M.D.

Disorders of uterine function are an important factor in the life of woman. As in woman every function sympathizes with uterine life, so the uterus itself is in turn affected by the condition of even the most distant parts. Thus, any disease affecting a woman, between the ages of puberty and the menopause, may cause disturbance of the uterine function; and this disordered condition may persist long after the influences which called it forth have subsided. In dealing, therefore, with this class of cases, the practitioner has to consider not alone the local manifestations, important as these may be, but the history of the case, the gradual progression of the disorder from organ to organ, and, especially must he seek out and define those pathological conditions which have become buried beneath later states, and no longer manifest themselves to the casual eye, but which nevertheless are important obstructions to a permanent cure. Doubtless this is true of disorders in other parts of the system, and in diseases affecting men as well as women, but it is so preëminently true of abnormalities of uterine function, and so thoroughly a part of rational and effective therapeutics in these conditions, that it seems necessary to state it thus as the basis upon which all that shall follow may rest. There are three well recognized aberrations from normal menstruation: imperfect flow (amenorrhœa); excessive flow (menorrhagia); and the presence of local pain during the flow (dysmenorrhœa). But these terms merely express the leading characteristics of a given case; in practice, the symptoms and conditions are so varied, and often so varying, that an accurate classification is impossible.

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* Nouveau Dictionnaire de Médecine et de Chirurgie Pratiques, tome xxv., p. 511.

AMENORRHŒA.

The term amenorrhœa is very broad in its application, and covers entirely distinct pathological and physiological states. All cases in which menstruation is altogether absent, as well as those in which the quantity of the catamenial flow is less than it should be, are vaguely classed under this title; for more satisfactory study these cases may be divided into (*a*), those in which menstruation has never been established; (*b*), those in which, having made its appearance, it has subsequently ceased; and (*c*), those in which there is a sensible and constant diminution of the amount of flow. The first of these, the cases in which *menstruation is not and never has been present*, may now engage our attention.

Ordinarily, in this climate, puberty asserts itself about the fourteenth year, but this is very much a matter of family characteristic, in some families the women not arriving at puberty until the seventeenth or eighteenth year. If a girl goes much beyond the time at which her own mother, or that grandmother whom she most resembles physically, began to menstruate, it is desirable that inquiry should be instituted as to the probable cause; but for evident reasons no girl should be subjected to a physical examination unless her health shows manifest deterioration which by reasonable probability is referable to sexual abnormality.

I. The first class of cases of the non-appearance of the catamenia are those in which there is present no positive morbid symptom, and in which the only aberration from perfect health is the absence of the monthly crises. In some cases this constitutes an idiosyncrasy of development; the breasts remain rudimentary, the features, emotions and thoughts childish; the case is simply one of delayed sexual development, and is usually a sign of corresponding longevity. Again, there are cases in which experience shows that perfect health is maintained and perfect development secured, but with no resulting menstrual flow. Many such women have married and borne healthy children without ever having once menstruated, and there are others who have never menstruated until after the birth of their first child. It is a safe rule to follow, that so long as no abnormal symptom develops, except the absence of the menstrual flow, there should be no medicinal or mechanical interference.

II. The continued and complete absence of the menses in women who have long passed the ordinary age of puberty may reasonably awaken suspicion as to the presence of congenital malformations, and it becomes necessary to determine whether the organs essential to the performance of this function are actually present. Congenital absence of the uterus or ovaries is extremely rare. The uterus is sometimes rudimentary and incapable of development, while at the same time the external genitals and sexual sentiment may be normal. If, however, the ovaries are absent or obtunded, there will also be a corresponding lack of development elsewhere, as absence of sexual desire, a deepened tone of voice, a prominence of hair at the corners of the upper lip, and otherwise a blending of masculine and feminine characteristics.*

More usual than these, however, is the retention of the catamenia by an imperforate hymen, absence of the vagina, or the occlusion of its walls, or atresia of the mouth of the uterus. The menstrual molimina recur from month to month with ever-increasing pain and discomfort; the appetite is impaired, the bowels become torpid, and the urine is voided with difficulty; the uterus, unable to re-absorb completely the retained discharge, gradually increases in bulk, and may be felt as a fluctuating tumor in the hypogastric region; gastric symptoms, similar to those present in the earlier stages of pregnancy, appear; the breasts become swollen and painful; and at last, when the accumulation of retained fluid has distended the uterus to its full capacity, pains in the back, resembling those of the first stage of labor, and due to the irritation of the muscular walls of the uterus, are experienced. If the retention be caused merely by an imperforate hymen, the trouble is easily remedied; but the absence of the vagina, or the adhesion of its parietes, or the congenital atresia of the uterus, are serious conditions, requiring skilful surgical interference. This condition, unless speedily relieved, terminates fatally either by convulsions from reflex irritation, rupture of the uterus, inflammation of the peritoneum, or marasmus, according to the relative severity of various symptoms.

III. By far the larger number of cases of non-appearance of menstruation, however, fall within the domain of medication, and these may be known by the failure in general health which is easily discoverable upon the most cursory examination. There need be no difficulty in distinguishing between these various classes; and just as the first class would be injured by the exhibition of drugs, and the second are evidently without the pale of drug-action, so the latter are in need of, and readily amenable to, carefully selected remedies. In the first two classes the trouble is local, being dependent upon an incomplete development of the ovaries or upon organic deficiency in some portion of the genital tract; but in this third class the cause lies deeper and is more obscure; it is dependent upon some dyscrasia or cachexia (chlorosis, tuberculosis, rachitis, scrofulosis, or vaccinosis), and can only be efficiently treated by determining and curing the morbid condition which is the foundation upon which all these disease-symptoms rest.

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* These malformations are succinctly treated, and a very large number of illustrative cases given, in Küssmaul's *Von dem Mangel, der Verkümmerung und Verdopplung der Gebärmutter*. Würzburg, 1859.

This last class of cases constitute at once the most interesting and the most difficult cases which we are called upon to treat. It will generally be found that denutrition is a very important factor, and whether it show itself in the tubercular diathesis or as a scrofulous or syphilitic taint, or as the result of an impure vaccination, the derangement of the digestive and trophic systems is evidenced in the failing strength, increasing lassitude, indisposition to mental or physical exertion, inappetency, wandering pains, and progressive emaciation.

Any attack of severe illness, occurring near the age of puberty, may cause delay in menstruation, or indefinitely postpone its appearance. Dr. West mentions the case of a girl who had scarlatina at fifteen, which had the effect of delaying menstruation up to the age of twenty.*

Imperfectly Established Menstruation.—Cases are frequently met in practice in which the menstrual discharge has occurred once, or several times, but imperfectly, and has subsequently ceased altogether. Sometimes this natural flow is replaced by a discharge, normal as to time and quantity, but too light in color, so as to be mistaken for a leucorrhœa which it somewhat resembles in appearance. Sometimes it is replaced by hæmorrhage from the mucous lining of the nose, buccal cavity, lungs, stomach, or bowels, from the eyes or ears, from wounds and sores, and from telangiectases. These hæmorrhages may occur with the regularity of well-ordered menses, or may recur at irregular and uncertain intervals; they are not especially important in themselves, but indicate a tendency to retrograde metamorphosis in the organ whence they come. Thus a vicarious hæmoptysis does not indicate tubercle in the lung, but it does indicate an impaired state of that structure which may eventuate in tuberculosis if the condition be not remedied.

The cause of this imperfectly established menstruation is sometimes obscure and recognized with difficulty. In most cases improperly prepared or insufficient food, evil dietetic habits, undue rapidity of growth, over-study, over-work, or exhaustion, are the real cause of the trouble; but it may result in the well-fed and robust, from over-exertion in riding, lawn tennis, or from standing upon the feet for hours, as is the case with shop-girls. Just at puberty the uterine tissues are very soft, and even ordinary exertion may cause displacement resulting in amenorrhœa.

Partial Amenorrhœa.—When the menses recur at irregular intervals, after having been once fully established, the cause may generally be found in constitutional derangement, though in some cases the health does not appear to suffer much, if at all. The varieties of this form of amenorrhœa are numerous. It may simply be an undue prolongation of the interval, and the discharge in quantity and quality remain quite normal. Again, the menses may lapse altogether for several months, and then recur at monthly intervals for a brief period, and then again fail to appear. Or the flow may appear at the right time, but be scant in quantity, or pale and watery. This condition deserves serious and studious care on the part of the practitioner. It yields to the rightly selected remedy, save in cases in which it is the expression of a progressing organic disease elsewhere; usually the determining symptoms upon which a proper prescription is based will be found, not in the local trouble, but in the mental and moral state of the patient.

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* Lectures on Diseases of Women, p. 34.

Suppression of Menstruation.—The catamenia may be suppressed from moral as well as physical causes. Among the more frequent causes we find sudden exposure to cold, standing on a damp floor, taking a cold bath at the period, changes in clothing, check of perspiration when heated, etc. This cessation of the menses is due to inflammatory processes, whereby the peritoneum extending over the ovaries, womb, and Fallopian tubes is suffused with lymph.

Suppression will also occasionally recur in young girls who have special reason to apprehend it, the trepidation of mind being so great, as the monthly period approaches, as to cause what may be termed a psychological influence over the uterine functions whereby the flow fails to appear, although there is present no physical reason whatever for its cessation. Also a profound emotion, such as fear or grief, may cause a temporary suspension of menstruation, just as the same emotions may bring on the menses when stopped by other causes.

Suppression of menstruation due to pregnancy is a physiological, and not a pathological, state, and need not detain our attention here. An examination of the abdomen, the vagina, and the breasts will satisfy the practitioner as to whether, or not, pregnancy is the cause of the cessation of the flow. Care must be exercised by the examiner in the use of sounds, etc., or he may unwittingly interfere with the contents of a gravid uterus in women who have reason to desire not to be found pregnant.

Among other causes of cessation of menstruation may be enumerated sexual intercourse during the flow; an attack of any of the exanthematous diseases; a sea voyage or a residence at the seaside; change of residence from a low sea-level to a high one; flexions of the uterus; chronic hypertrophy of the uterus; fibrous, and other, growths within the uterus; stricture of the uterine cervical canal, following pregnancy, or the use of caustics; cystic, or other, disease of the ovaries; chronic peritonitis; finally, it may occur without any assignable reason.

Symptomatology.—The various forms of amenorrhœa differ much in their outward manifestation and concomitants, as well as in their essential nature. One of the most constant symptoms is headache, which is usually felt on the top of the head or upon one side. The portal and pelvic circulation becomes embarrassed, resulting in constipation, varicosis of the lower extremities, lassitude, palpitations, lowness of spirits, and dropsical effusions. In milder cases dyspepsia may be the only associate symptom, while in severe cases the patient may hover on the borderland of dementia.

Diagnosis.—The diagnosis is always self-evident, although some patients dwell exclusively upon the concomitant symptoms, and will ignore, and even deny, the real source of the trouble. The *prognosis* is always favorable, except when the disorder is consecutive to some organic disease.

Treatment.—The importance of proper attention to the health of girls approaching the age of puberty is generally overlooked. Most girls are permitted to arrive at this period without any adequate knowledge as to its effects on their subsequent life, and the result is ill-health that might have been avoided.

Our first duty then is as to preventive treatment. The question of dietary and hygienics should receive careful attention. The effects of insufficiency of food and clothing, badly ventilated sleeping-rooms, irregular habits, especially late hours and over-study during the earlier teens, are felt through all the subsequent life, and are the direct cause of much feebleness of women with which we have to contend. The maintenance of a proper degree of nutritional activity at this period is of prime importance, and this can only be secured by proper food, proper exercise, and proper limitation of intellectual work. But while food, exercise, and mental activity are necessary to perfect health, this latter can only be secured in the individual by the due adjustment of the former to her particular needs; it is just here that the careful oversight by the family physician can be productive of so much good.

Amenorrhœa, caused by the absence of, or congenital defects in, the organs of generation, is rarely completely cured. The operative measures recommended by the leading gynæcologists, and the success likely to attend them, are well set forth by Professor Graily Hewitt; to his work* the reader is referred.

In partial or complete suspension of menstruation all the morbid peculiarities of the patient and her habits of life must be carefully studied, for in them will be found the true cause of the disorder; no real and permanent restoration to health can be anticipated from any course of treatment which does not take into consideration these ulterior conditions. It cannot be too strongly impressed upon the mind of the practitioner that amenorrhœa is not a disease, only a symptom. The first thing, then, to do is to firmly establish the general health; and it will usually be found either that the patient is suffering from a form of chronic starvation, or that she has been leading a sedentary and artificial life. As a rule, these cases are best treated by rest, abundant food, and fresh air. Prolonged exercise, long walks, or even a constantly maintained sitting posture are usually not beneficial. A recumbent position at the menstrual molimina, for several days, is advantageous, as it frees the uterus from undue weight. If indigestion is a prominent and troublesome symptom, it may be best met by one of the artificial pre-digested foods, administered in small quantities at brief intervals. Valentine's meat juice and Murdock's liquid food I have found of great value in these cases. Even in cases where the amenorrhœa is due to flexion, the dorsal-horizontal position, combined with a highly nutritious diet, will often restore the uterus to its proper shape and induce the flow.

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* Graily Hewitt on Diseases of Women, vol. ii., pp. 40 et seq.

Having ordained a proper regimen, the physician should now find the remedy which corresponds to the totality of the symptoms; the following are mentioned merely as therapeutic finger-posts, and not as by any means limiting the choice of the remedy to one of those here given.

Young Girls.—Delay of the first menses will most frequently require either Calcarea carb., Sulphur, Pulsatilla, or Silicea.

Calcarea is generally to be preferred for stout but unhealthy appearing girls, with large abdomen, fair complexion, poor digestion, constipation, weariness, especially affecting the lower limbs, and want of vitality. If incipient tuberculosis is suspected, Calcarea is almost sure to do good. In the acid dyspepsia and other derangements of nutrition, with the characteristic easy perspiration, and in delayed menstruation associated with strumous affections of the eye, glands, or joints, Calcarea will generally prove curative.

Sulphur is to be preferred to Calcarea when the skin is covered with papular eruptions, or there is heat in the head, palms of the hands, and soles of the feet, with dyspnœa on going up stairs, palpitation, and emaciation.

Pulsatilla is especially adapted to girls of a mild and gentle disposition who are anæmic without being chlorotic, with a general tendency to coldness, or who suffer from cold hands and feet, with fulness and heat about the head. The Pulsatilla patient feels worse in the afternoon and evening; her pains shift about from part to part; she feels better in the open air and when exercising, but is disinclined to exertion; her appetite is poor, with longing for acids; sour taste in the mouth after eating; nausea; she is sad rather than melancholic; her emotions are easily aroused; she dreads men and society; faints on slight provocation; and is changeable, forgetful, full of cares, and suffers from a tremulous anxiety.

Silicea is less frequently used than it deserves to be. It will often replace Calcarea in constitutional disturbances. Offensive or suppressed foot-sweat; profuse night-sweats; watery and corrosive leucorrhœa; tenderness and itching of the external genitals; constipation, when the stool recedes after being partially expelled; vertigo, increased by emotions or mental exertion; tendency to abscesses and furuncles; and a failure of quick response to other well-selected remedies are indications for it.

Thuja and **Silicea** are of value where there is reason to suppose that the morbid condition arises from an impure vaccination. If chlorosis be concomitant with delayed menstruation, one of the above remedies may be indicated; but more probably the choice will fall upon Ferrum, Senecio, Plumbum, China, or Natrum mur.

Ferrum is the sheet-anchor in the old school: "There is scarcely any point in therapeutics so fully established as the remarkable efficacy of iron in removing all the symptoms of chlorosis."* It is not of such universal application with us, and is most effective in cases coming from old-school practice, who have been dosed with quinine and nervines. The Ferrum patient has rushes of blood to the head, with throbbing headache, is disposed to lie down and keep quiet; is greatly emaciated, and her face is very pale or livid, with blue margins or œdematous swellings about the eye, and bloodless lips.

Senecio is useful to girls who are originally robust, and who, in becoming chlorotic, have not ceased to be stout; but they are very hysterical, have a nocturnal cough, and a tendency to œdema of the lower extremities.

Plumbum is frequently of the greatest value in these cases. Its powerful alterative action upon the blood, and its direct influence over the uterus and its functions, should lead to its careful study in this disorder. It is not likely to become a routine remedy, but in several cases I have seen, it produced almost marvelous results. The disposition to yawn and stretch, the presence of acute abdominal pains, cough with bloody expectoration, vesical tenésmus, extreme sensitiveness to cold, and a quiet melancholy are the concomitants which should direct attention to this remedy.

China, while more useful in profuse and too frequent menstruation, should not be overlooked in the study of chlorosis. It is indicated by apathy during the day, and great mental activity after nightfall; face pale and sunken, nose pointed, and eyes surrounded by blue margins; general soreness of the whole body; very debilitating sweats at night, in the morning, or breaking out on the slightest exertion; and severe headache.

Natrum muriaticum has served me well in chlorosis when the skin had a dull, withered look, as if the dermal capillaries were entirely emptied, and the patient lost flesh, although eating a reasonable amount.

Vicarious Menstruation may be cured by Bryonia, Kreasotum, Ustilago, Pulsatilla, Hamamelis, Millefolium, or Phosphorus. Vicarious hæmorrhage from the nose or stomach, of dark red blood, with pain in the back, will generally yield to *Bryonia*. If the blood is bright-red, and comes from the lungs or stomach, *Millefolium* will cure. *Ustilago* is suited to women of a consumptive appearance, when the hæmorrhage is of dark-colored or coagulated blood. *Hamamelis* answers well for all passive hæmorrhages, where the bleeding relieves the uncomfortable sensations. *Kreasotum* has done me good service in hæmoptysis, when loss of memory and general prostration were marked features of the case. *Phosphorus* will benefit young girls who have grown too rapidly, whose ailments are mainly left-sided, and who are hungry all the time. *Pulsatilla* is useful in nose-bleed in young girls who have leucorrhœa or other catarrhal discharges. Remedies will act efficiently only when closely affiliated to the general condition of the patients, and the meagre list here given is simply intended as pointing to the more commonly indicated remedy.

Suppression of Menstruation from a Cold, if taken at once, may usually be relieved by a few doses of *Aconite;* but if there has been a delay of several days, more probably *Pulsatilla* (from getting the feet wet), *Dulcamara* (exposure to raw, damp air), *Chamomilla* (checked perspiration), *Rhus toxicodendron* or *Calcarea carb.* (washwomen, or other workers in water), *Antimonium crud.* (bathing in cold water), or *Nux moschata* (from getting the garments wet) will relieve.

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* Ziemssen's Cyclopædia, vol. xvi.

Suppression occasioned by Fright or Sudden Emotions will yield to *Ignatia* (grief or great anxiety), *Chamomilla* (anger), *Colocynth* (chagrin), *Staphisagria* (indignation), *Helleborus* (disappointment), Aconite (fright), *Lycopodium* (fright), *Cimicifuga*, *Opium*, China, Pulsatilla, *Belladonna*, or *Platina*, provided the remedy selected not only covers the symptom "suppressed catamenia," as well as the probable cause, but also the other abnormal conditions of which the patient may complain.

Irregular though not entirely suppressed menses may call for Graphites, Apis, Caulophyllum, Aletris, Helonias, Causticum, Cyclamen, Kali carb., Lilium, Kalmia, Zincum, Conium, Baryta carb., etc.

Graphites is doubtless one of our most valuable curative agents when menstruation delays, and the final output is scant and thin. The ovaries are anæmic, and unable to perform their function, and the period is ushered in by a variety of pains and aches. The Graphites patient is inclined to obesity, is constipated, her stool being large and knotty, and requiring much straining; her skin is unhealthy, and injuries heal but slowly; her nails are deformed, and all her troubles tend to become chronic. Dr. Dudgeon was the first to call attention to Graphites as curative of indurated ovaries with amenorrhœa,* a bit of experience which has since been duplicated by many homœopathic practitioners.

Apis, next to Graphites, probably has the first claim in irregular menstruation; but the Apis-amenorrhœa results from active congestion of the ovary. The discharge is scanty and intermitting, with stinging pains in the (right) ovary, congestion to the head, scanty urination, thirstlessness, œdematous swellings, and marked awkwardness.

Caulophyllum is often useful in menstrual irregularities consequent upon miscarriage. It is indicated by the peculiar spasmodic pains in the back, bowels, bladder, and rectum. The uterus is very irritable, and the patient is restless and nervous. Moth spots on the face may call attention to this remedy.

Aletris will benefit anæmic women whose whole system has become lethargic, and who in consequence suffer from indigestion, constipation, vertigo, sleepiness, and have frequent attacks of fainting.

Helonias is adapted to women who are worn out with hard work, and whose muscles burn and ache, but who are not anæmic. Dr. S. A. Jones has well described the peculiar amelioration of all the symptoms when mind and body are engaged in active pursuits, a peculiarity which I have often verified: "The headache disappears when the attention is engaged. The pains vanish when one is busied. The sense of profound debility is lost when exercising. When one turns from the book and goes into a half reverie, then comes the headache. When one sits purposeless, then come the burning, aching pains. When one feels as if she could scarcely drag one foot after the other, she is astonished to find that the sense of rest is gotten, not by lying on the couch, but by walking." The Helonias patient has a marked desire for solitude, and a mental condition closely resembling that in the opposite sex arising from masturbation and sexual excess. The patient is censorious and fault-finding; quite the opposite from the Senecio or Pulsatilla condition of mind.

Causticum is useful when the flow is feeble as well as tardy, and intermits altogether when the patient lies down, or when it ceases, and after a day or two begins again, and then ceases and begins again, and so continues; or when the amenorrhœa is caused by anxiety, night watching, or long-continued grief, with excessive tissue-waste; or is but a part of the general paresis.

Cyclamen very closely resembles Pulsatilla, and seems to stand midway between it and Helonias. It is adapted to that class of persons "who are born tired," but who feel better when mind and body are engaged with urgent duties.

Kali carb. is indicated when the menstrual discharge, which is thin, acrid, and pungent, excoriates the parts with which it comes in contact, and causes an eruption. All the concomitant symptoms are aggravated at 2 to 3 A.M.

Lilium should be studied when the patient is always in a hurry, or has pressure in the rectum, with almost constant inclination for stool; or suffers from stinging pain in the ovaries, complicated with cardiac symptoms. Like Causticum, the catamenia flows only when the patient is moving about, but it smells like the lochia, and is followed by a bright-yellow leucorrhœa. Lilium is a slow-acting remedy, and if chosen must be allowed plenty of time to do its work. Whatever may be the present symptoms, the condition can be traced back as originally ovarian, or Lilium is not the homœopathic remedy. It somewhat resembles Apis, but affects chiefly the left ovary, while Apis acts best on the right. The Lilium patient is rather amorous; the Apis patient somewhat indifferent.

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* Brit. Journ. of Hom., xxxi., 183.

Kalmia, like Caulophyllum, acts with greater certainty upon rheumatic persons. The menses are always scant, but variable in time; and when suppressed or delayed, the patient suffers from severe pains of a wandering character, now here, now there. Kalmia, like Lilium, is adapted to cases with cardiac complications, but the concomitant symptoms are very different and easily distinguishable. It is our most efficient remedy in irregular or suppressed menstruation with albuminuria.

Zincum is rarely called for in this disorder; but when amenorrhœa is associated with irresistible sexual desire, with exquisite sensitiveness of the external genitals, or with varicosis of the parts, or with brain-fag, it acts with great precision. The Zincum patient is always anæmic.

Conium is one of our better known remedies for the menstrual irregularities of elderly spinsters. The patient has shrivelled breasts, which become sore at every menstrual crisis; the flow is feeble and scanty, brownish and watery; she is hypochondriac and hysteric, and is troubled with vertigo when in a recumbent position an effort is made to turn over. Nervous symptoms predominate, but there is a distinct impairment of motor-power, and the "go" is all taken out of her.

Baryta (its salts) is useful at the extremes of menstrual life—for young girls of retarded development, and for obese, elderly women; and in both cases there is marked weakness of the mind. The flow is very scanty, and perhaps lasts for a single day. The patient is subject to fatty tumors and chronic glandular swelling. It should be studied in connection with Conium, Sepia, Causticum, and Silicea.

Plethoric women may be benefited by Aconite, Belladonna, Bryonia, Gelsemium, Nux vomica, Opium, Platina, Sabina, or Sulphur.

Debilitated women may require Aletris, Alumina, Arsenicum, China, Cimicifuga, Conium, Drosera, Graphites, Hyoscyamus, Iodum, Natrum mur., Nux moschata, Phosphorus, Pulsatilla, Rhus tox., Sepia, or Sulphur.

Climaxis.—Sepia, Pulsatilla, Conium, Ignatia, Sanguinaria, Lachesis, Glonoine, or Sulphur. See also Dysmenorrhœa.

Constipation.—*Æsculus* (large, dry, hard, difficult, dark), *Alumina* (dry, hard, light-colored), Baryta (scanty, lumpy, difficult), *Bryonia* (large, dry, burnt-looking), Calcarea carb. (hard, undigested, clay-like), China (difficult, but soft), Colocynth (tympanitis), Conium (ineffectual desire, with chilliness during, and tremulous weakness after, stool), *Graphites* (lumps united by threads of mucus), Hamamelis (hard, coated with mucus), *Lycopodium* (hard, after stool feeling as if much remained unpassed), *Magnesia mur.* (extreme hardness, nodular, crumbling), Mercurius (like sheep-dung, or as a narrow ribbon), Natrum mur. (alternating with diarrhœa), Nux vomica (almost constant desire), *Phosphorus* (like a dog's), *Platina* (clinging to the anus), Plumbum (like sheep-dung), Pulsatilla (alternately hard and soft, but always difficult), Sepia (hard, knotty, insufficient), Silicea (inability to expel the stool, though soft), Sulphur (chestnut or olive-shaped).

Cough.—Bryonia (dry, as if head and chest would split), Drosera (violent, periodical). **Graphites** (only in daytime), **Kali carb.** (paroxysmal, from 3 to 4 A.M.), **Phosphorus** (tight, with hæmoptysis).

Dyspnœa.—**Ammonium carb.** (on going up even a few steps), **Arsenicum** (air-passages seem constricted), **Belladonna** (short, hurried, anxious), **Bryonia** (as though the lungs would not expand), **Calcarea carb.** (slightest exertion, must sit down), **Cocculus** (choking feeling in the throat), **Conium** (in wet weather), **Ferrum** (as if a weight on chest), **Graphites** (awaking from sleep after midnight, relieved by eating), **Hyoscyamus** (nocturnal, when lying), **Ignatia** (sighing), **Iodum**, (going up stairs), **Kali carb.** (early in the morning), **Lycopodium** (4–8 P.M.; lying on back; in open air), **Nux vomica** (after eating; from cold air; after midnight), **Phosphorus** (anxious, panting, labored), **Pulsatilla** (as from fumes of Sulphur), **Sulphur** (at night wants doors and windows open), **Veratrum alb.** (in damp, cold weather).

Œdematous conditions.—**Apis**, **Apocynum**, **Arsenicum**, **Calcarea carb.**, **China**, **Ferrum**, **Graphites**, **Helleborus**, **Iodum**, **Kali carb.**, **Lycopodium**, **Phosphorus**, **Pulsatilla**, **Senecio**, **Sepia**, **Sulphur**.

Melancholia.—**Ammonium carb.** (anguish, as if she had committed a crime), **Arsenicum** (fears she will die suddenly and alone), **Ignatia** (moaning and groaning while asleep), **Natrum mur.** (aggravated by consolation; she gets mad at trifles), **Pulsatilla** (full of tears; dread of men), **Secale** (illusions; fear of death), **Sepia** (indifference), **Staphisagria** (harsh words hurt her very much), **Sulphur** (great inclination to religious speculations), **Xanthoxylum** (frightened feeling; fears she is going to die), **Zincum** (sensitive to all noise).

[Quite a number of remedies will be found under the headings PLETHORIC WOMEN, *et seq.*, not mentioned in the previous text. These all have amenorrhœa as a symptom, and should be studied in making the selection of the proper remedy for any given case.]

Auxiliary Treatment.—It is proper to call attention to the current and approved uses of heat and electricity. The influence of heat on menstruation is shown by a difference of three years in its onset between women of tropical and north-temperate latitudes, by the menses making their first appearance usually during the warm months throughout the temperate zone, and by the frequency and profuseness of the flow among those women whose occupation subjects them to the prolonged influence of artificial heat. On the other hand, the exposure to cold is the frequent cause of cessation of menstruation, as is well known. The use of hot water as a local or general bath, sitting over steaming water, and warm vaginal douches are familiar examples of the use of caloric to restore the impeded flow. The Turkish and Russian baths are to dwellers in cities a pleasant and desirable adjuvant in the treatment of this form of amenorrhœa if there be no serious impairment of vitality. Dr. Tilt, however, calls attention to the fact that bathing-women live in the sea as it were, without becoming amenorrhœic, and that a hot bath will stop the menstrual flow in some women in whom it is made more abundant by putting the feet in cold water.* Dr. Chapman's recommendation of the ice-bag to the lower portion of the spine as a cure for this disorder, does not seem to have met with much success outside of his immediate practice, and should be used with great caution on debilitated patients.

The faradic current has been very extensively applied in the treatment of this disorder, and with good results; but there has been considerable difference of opinion as to the best manner of using it. Duchenne faradized the womb itself; Althaus placed one electrode on the lumbar region and the other just above the pubes; and Mackenzie puts the positive pole on the nape of the neck and the negative in the vagina against the uterine cervix.

MENORRHAGIA.

Menorrhagia is the menstrual flow extending beyond its due proportion, and occurs in great variety. It must not be confounded with metrorrhagia, which is a hæmorrhage from the uterus not connected with the menstrual nisus.

The catamenial discharge in quantity varies greatly in different individuals, and what would be an excessive flow in one person is perfectly normal in another. Families differ greatly in this respect, some being great bleeders, and able to lose, without harm, an amount of blood which would exsanguinate other women. But habit is not always a safe guide, for some girls are menorrhagic from the first, and these cases exact careful discrimination on the part of the practitioner. Age, climate, and every other circumstance, as well as this personal idiosyncrasy, must be taken into account in determining whether the menstrual secretion is excessive.

Sometimes this increase in the catamenial flow is but slight, and has little influence upon the general health. But it may come as a flood, or continue so persistently as to be followed by most disastrous consequences to the general health of the patient, and even terminate her life. In some cases the ordinary number of days is not exceeded, but the flow is very profuse while it lasts. Or, the flow may be normal in quantity day by day, but continue on for a week, or more, sometimes merging into the next period without a break. Or, it may be abnormal both in quantity and time. The character of the flow differs widely, in some cases being pure blood, and descending in the scale through every variety of clotted or clear fluid, to others where the flow is merely blood-stained water. This unnatural catamenia may flow steadily or intermittingly, but as a rule the flow is spasmodic, occasional gushes alternating with a slight or passive discharge. If this abnormal state continues for any considerable time, the blood of the patient becomes impoverished, which will, in itself, be the determinate cause of the chronicity of this disorderly flow. A long-standing menorrhagia, even though the discharge be never actually very profuse, produces impairment of function in all the organs of the body, and profound changes in its tissues. Professor Guernsey classifies menorrhagia as organic, sympathetic, or functional, and under one of these three heads all cases of this disorder naturally fall.

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* Edward John Tilt, Uterine Therapeutics, 173.

Organic Menorrhagia implies that the profuseness of the flow is dependent upon, and is merely a symptom of, some positive disease of the uterus or its appendages. The menorrhagia may be the advance symptom of some impending structural change, for such changes are necessarily preceded by congestion to the part in which the metamorphosis is about taking place, and this cannot but be greatly aggravated by the physiological congestion which recurs at the menstrual nisus. The careful practitioner will, therefore, be very guarded in his prognosis if, without any other visible cause, the menses become persistently profuse or markedly changed in character; but he may also, by recognizing the gravity of the situation, and by a careful study of the collateral conditions, be able, with well-timed medication, to reverse the retrograde action going on within the sexual apparatus, and ward off the impending danger, a result which could not be accomplished at a later stage of the disease. The actual presence of structural disorganization or changes in the shape or size of the uterus, or any of its appendages,—whether these be a fungous condition of the mucous membrane of the uterus, ulceration of the os, cervix, or lining, subinvolution after miscarriage or parturition, cancerous, fibrous, or polypoid growths, flexions or versions,—will generally cause prolonged and profuse menstruation.

One of the most important, and a frequently overlooked, cause of menorrhagia is laceration of the uterine cervix.

Defective involution of the womb, commonly caused by getting up too soon, and therefore more liable to follow abortion than parturition at full term, is a very frequent cause of menorrhagia. Probably the most common cause of this disorder is flexion of the uterus. It is in these cases that the flow comes in gushes, accompanied with clots. Owing to the flexion, the blood is prevented from escaping, and being hemmed-up in the uterus, distends that organ, which gradually rises as it increases in size, thereby straightening itself and permitting the escape of retained and partly coagulated fluid. The womb then falls back again into its former position, and the process repeats itself. Eventually the uterine cavity becomes permanently enlarged, and its walls hypertrophied. Hæmatocele, in such cases, occasionally results from the passage of blood from the uterus into the peritoneal cavity.

Profuse menstruation may also occur in cases in which the structural disorder has apparently altogether subsided, leaving, however, a passive congestion which is quite capable of continuing the menstrual derangement. Indeed, some of the most difficult cases to cure fall under this category.

Sympathetic Menorrhagia is that form which appears in Bright's disease, in pulmonary consumption, in diseases of the heart, in chronic liver complaints, in typhus and typhoid, in cholera, in the exanthemata, in persons suffering from malarial poison, and in the victims of lead-poisoning. When it occurs as a phase of febrile disease it portends a fatal issue; under all circumstances it is a very grave complication. It is least so when it occurs at the onset of the pyrexia, or after convalescence is well established, but even then it should receive the physician's careful consideration. The menorrhagia of tuberculosis is a very critical symptom, and, like the intestinal flux which frequently supervenes, reduces the patient's strength and seriously depresses the already lowered powers of digestion. Bright's disease, by depriving the blood of its albumin, produces a condition of that fluid which is favorable to exudation, thus allowing the escape of an abnormally large amount of blood from the congested uterus. Any influence which gives rise to a watery or defibrinated condition of the circulating fluid may occasion menorrhagia or metrorrhagia. Diseases of the heart, by retarding the return of the blood to the right ventricle, cause pelvic stasis, and so occasion, at times, very profuse menstruation, the discharge in these cases seeming to afford relief to the organism.

Any condition which favors pelvic congestion—particularly chronic disorder of the great viscera, stomach, liver, spleen, etc.—will induce excessive menstruation. Women living in damp or marshy districts are very prone to profuse menstrual flux. The telluric disturbances in the upper part of Manhattan Island, occasioned by the Harlem Railway improvements, in 1871 *et seq.*, created almost epidemic menorrhagia along its route, and many women in that region are still suffering from its effects. Removal from the densely inhabited portions of the city to the malarious districts of Westchester has often, in my experience, brought on a very persistent menorrhagia, even in cases where there was absence of all other evidences of intermittent. Change of residence from cold to hot climates is also a frequent factor. English women going out to India often break down in health completely from exacerbation of the catamenial depletion. Menorrhagia is a common symptom in women suffering from lead-poisoning. I had two cases of this sort at the Manhattan Hospital, in which I was able to verify the conclusions of Paul* and Graily Hewitt. Mental disturbances, long-continued mental depression, and mania produce a similar effect.

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* Arch. Gén. de Méd., 1860.

The term *Functional Menorrhagia* implies that the difficulty is due solely to functional disturbance, without organic affection, general or local. Luxurious living, sedentary habits, or unhealthy occupations may give rise to this condition. Mention may here be made of all those cases which depend upon general debility of the system without actual disease, as from having children too rapidly, excessive lactation, sexual excesses, and other forms of over-exertion. Excessive coition, both mechanically and by its influence upon the mental sphere, tends to determine a superfluity of blood to the parts, stimulates the ovaries to an abnormal degree of functional activity, and so deranges the menstrual discharge. The climaxis is frequently accompanied with menorrhagia; the flow becomes irregular or stops altogether for several months, and then returns in great profuseness. Climacteric menorrhagia more frequently occurs in women of a sanguine temperament and in those who have been subject to profuse menstruation; but this rule is not of universal application.

Diagnosis.—Not every discharge of blood which may issue from the female generative apparatus can be classed as menstrual. An examination may reveal that the hæmorrhage does not escape from the uterus, but comes from the vaginal walls, or from the urethra, or from a varicose vein. A careful examination of the uterus and vagina, when unusual losses of blood have occurred, as well as of the clots and other substances which have passed, is essential to the proper diagnosis of the case. As a rule, women have such a mistaken idea as to the danger of stopping the menstrual flux that they will allow themselves to be brought very low before calling attention to its abnormal character; and even when questioned, will often claim to be "regular," when the flow, may be, returns every twenty-one days and lasts for eight or nine. It therefore behooves the physician, in the examination of cases, to depend for a diagnosis upon his own judgment rather than upon the statements of the patient, especially if the latter is ignorant or vicious.

Prognosis.—In functional menorrhagia, if the habits or occupation which initiated the disorder can be changed, or no longer exist, the prognosis is favorable, and with judicious care in the selection of the remedy the progress of the patient toward a complete restoration to health should be rapid. I have often seen these cases, even when the menstrual derangement had existed for years, and in dispensary practice, where little could be expected from regimen and nothing from rest, restored to apparently perfect functional habit by a single dose of a carefully selected similimum; and, while it is not always possible to thus at once hit upon the true remedy, yet care in prescribing will always result in the improvement of the patient. In sympathetic menorrhagia, as well as in the organic form, much may be done at the period to control the excessive flow; but a cure can only be had by rectifying the primary trouble. Just how much can be accomplished in any given case can only be judged after all its factors are known.

Treatment.—It is obvious that the treatment of menorrhagia has two purposes: one, to stop the present loss of blood; the other, to so restore the natural equilibrium of the sexual system that the successively returning menses shall be normal in period, quality, and dimension.

In functional menorrhagia the flow is rarely severe enough to require local measures for its suppression, nor mechanical expedients of any kind beyond rest in a recumbent position. In all cases of menorrhagia the practitioner should insist upon the dorsal position being assumed and retained with as little variation as possible until the complete cessation of the flow, save only in those rare cases in which the flow is most profuse whenever the patient lies down. In sympathetic and organic menorrhagia it may be advisable at times to resort to special auxiliary measures which will be considered in a subsequent section of this article.

The question of the prevention of menorrhagia is interesting, but hardly practicable. Until we can secure to girls the privilege of being born healthy, and can have them properly educated hygienically and physiologically, abnormalities of menstruation are likely to be of frequent occurrence. The painstaking practitioner will, however, seek out in the habits and mode of life of his patient such as tend to prolong or intensify the disorder, and advise accordingly.

Therapeutics.—Ipecacuanha.—If the hæmorrhage is very severe, and it seems desirable to stop it at once, I give *Ipecacuanha*, unless some other remedy is characteristically indicated. Such profuseness is not as likely to occur in connection with the menstrual nisus as when the hæmorrhage is inter-menstrual (metrorrhagia), but when it takes place it needs special watchfulness on the part of the practitioner, because of the mental bias of the patient. A woman who would be alarmed by the loss of an ounce or two of blood from the nose or stomach, or by a moderate hæmorrhage from the vagina non-menstrual, will permit the most extensive bleeding and keep on her feet, if possible, when the loss occurs at the regular period.

Ipecacuanha is particularly indicated in menorrhagia when the flow is premature, very profuse, bright-red, and readily coagulable; associated with constant nausea, great weakness, so that she must lie down, griping pain about the umbilicus as if grasped by a hand, and a sense of suffocation. If the flow is dark in color, Secale or Cinchona will be more appropriate.

Secale.—The Secale menorrhagia is thin, brown or black, of a disgusting odor, and accompanied with violent spasmodic uterine contractions.

Cinchona.—The *Cinchona* menorrhagia is dark and coagulated, and the uterus is heavy and painful. In both the patient is violently thirsty. The Cinchona patient wants but little drink at a time, and that little very often. The thirst of the Secale patient is unquenchable and ravenous. The countenance in both is pale and sunken, the sight obscured, and the patient complains of roaring in the ears and difficulty of hearing. The Secale patient, though cold to numbness, does not wish to be covered, but the Cinchona patient, with all the bed-covers piled upon her, yet complains of the cold. The skin of the Cinchona patient is moist and clammy; of the Secale, dry and shrivelled. The latter complains of a sensation like ants crawling upon the skin; the former, that her garters and other garments feel too tight. The Secale patient is full of melancholy; the Cinchona, very nervous. Secale suits feeble, scrawny women;

Cinchona, those who suffer from sexual excesses, loss of the animal fluids, and whose symptoms show a marked periodicity.

Crocus somewhat resembles Secale, the discharge being dark and foul-smelling, but the distinguishing characteristic of Crocus is that the discharge is stringy and tenacious, sometimes coming away in long, black strings, increased on the slightest motion. All the text-books give "a sensation as of something alive in the abdomen," but, although I have prescribed for this symptom several times, I have never been able to verify it. In functional menorrhagia in young, unmarried women, Crocus is often the first choice.

Sabina is useful when the flow is either bright-red or dark and coagulated; more especially the former. The flow is made worse by the least motion; is rather paroxysmal, and generally of an offensive or fœtid odor. But the keynote is: "The indescribable uneasiness and restlessness in the lumbar vertebræ, and a drawing from behind the fundus uteri through the pubis and genitals, like labor-pains." With this will sometimes be associated an almost insatiable desire for sexual gratification. The pathological condition calling for Sabina is hyperæmia of the uterus; and the nearer this approaches the inflammatory stage, the more likely is this remedy to be of service.

Erigeron is an important remedy. It spends its influence on the genito-urinary tract, and acts best in those cases in which the menorrhagia is premature, very profuse, bright-red, increased by movement, and accompanied by frequent and urgent desire to urinate, and spasmodic pelvic pains.

Trillium has done good service in my hands. It is suitable to women who are naturally free bleeders (hæmophilæ). In case the menses return fortnightly, are bright in color, and come in gushes on the least movement, and are profuse almost to syncope, Trillium may always be depended upon.

Platina.—The catamenia returns too frequently and is much too copious. The discharge is very dark, thick, and tarry. It differs from Crocus in the extreme hyperæsthesia and irritability of the womb and appendages, and in the peculiar pain which seems as if the pelvic contents were being drawn downward. The pains of Platina begin gradually, increase to an excruciating severity, and then die slowly away. The mons veneris seems numb or cold, and so sensitive that she cannot bear the touch of the napkin. After menstruation, there may be intense voluptuous desire, but she shrinks from an embrace because of the painful sensitiveness of the vulva and vagina. The mental condition is significant. She seems to be growing larger and more important in every way, while everything about her is small, insignificant, and inferior. She has the most exalted esteem for herself, and expresses the greatest contempt for all about her. In all her moods she is very demonstrative: and, whether absurdly sulky or unnaturally hilarious, she succeeds in making herself "the cynosure of neighboring eyes."

Nux vomica.—The *Nux vomica* patient is likewise irritable, but she is impatient rather than censorious. She desires to be let alone, is taciturn, and only becomes malicious and demonstrative when intruded upon. She is excessively sensitive to all external impressions, and loud noises, strong odors, and bright light are intolerable to her. The inter-menstrual period is brief or irregular, while the discharge is long-lasting, very profuse, dark, thick, and coagulated. The symptoms are worse in the morning and immediately after eating, are increased by exertion and by exposure to cold air, and are ameliorated by rest and warmth. Nux vomica is especially adapted to women who are thin, dark-haired, easily excited, and choleric, and to those who suffer from mental over-exertion, sedentary habits, excess of coffee-drinking or stimulants, or from too much rich food.

Chamomilla had an ancient reputation for specific action upon the uterus, whence its name Matricaria. Culpepper, the astrologer and herbalist, said: "Venus commands this herb, and has commended it to succor her sisters, and to be a general strengthener of wombs, and to remedy such infirmities as a careless midwife has there caused." It is best suited to nervous, excitable blondes, who are usually good-tempered and courteous, but are at this time irritable, fault-finding, and completely unnerved by their sufferings. The menses return too soon, are very profuse, dark, clotted, and occasionally offensive. The flow is paroxysmal, and accompanied with griping pains, which make her feel hot and thirsty.

Ignatia.—The *Ignatia* menorrhagia is, likewise, too early, too profuse, dark, clotted, and offensive; but it differs from Chamomilla in the character of the pains and in the way the patient bears them. The Ignatia patient is uncomplaining and gentle, yielding though whimsical; feels anxious and hurried, yet sits still and broods.

The Chamomilla patient is impertinent; the Platina, supercilious; the Belladonna, boisterous, and the Nux vomica, irascible; this one is listless, inert, and lachrymose. How different the hysteric condition of Platina and Ignatia! In both there is a lack of functional coördination, and they develop all sorts of contradictory symptoms, but the Ignatia patient is crushed by her real or imaginary woes, and broods and weeps in silent retirement; the Platina patient defies her pains and surroundings, and projects her personality in demonstrative action.

Hamamelis.—The Hamamelis menorrhagia is steady, slow, sometimes trickling, dark, but not coagulated. The flow is moderate, but continues for a long time, producing great debility and lassitude. This remedy is useful in those passive hæmorrhagiæ, without much pain, in patients who suffer from varicoses, and who belong to the class of easy bleeders.

Ferrum is adapted to anæmic, delicate women, whose faces, though usually very pale, become fiery-red during the flow, or on even moderate exertion, or when emotionally disturbed. This patient is emaciated; suffers keenly from cold and dampness, and feels better when warm; she is so exhausted that she can hardly keep about the house. Usually, at the period, the head is hot and the extremities are cold. The headache is like a hammering from within, and, beginning in the occiput, pulsates forward along the sides to the frontal prominences. It is worse in the afternoon and when stooping. The flow is generally delayed and frequently intermittent. It comes on for a day or two, then ceases for some hours, returns, again ceases, but returns, and so on. The flow is partly pale and watery, and partly black and clotted. In 1881 a woman, in her climacteric, applied at the Manhattan Hospital for treatment, and came under my care. The flow had lasted for eighteen months, with at no time a longer intermission than two days. The case presented an almost complete Ferrum picture, even to the flow being always worse on cold or damp days. Ferrum was given. The flow stopped, the headaches ceased, appetite returned, her spirits improved, and within a week she was a new woman.

Bryonia is useful in that form of increased and anticipating menstruation in which the three well-known characteristics for this remedy are present: the aggravation from motion, the excessive thirst at long intervals for large quantities of water, and vertigo on rising from a sitting or recumbent position. These cases are not unfrequent among city-bred women of a slender, refined type. The menses are dark-red and are usually accompanied by a splitting headache.

Ustilago, from its general physiological resemblance to Secale, might reasonably be expected to prove of service in menorrhagia. I have seen it do good service when the menses returned every three weeks, and lasted nine or ten days. The flow was moderate and passive, in this resembling Hamamelis. It consisted of dark blood, partially coagulated and of a somewhat offensive odor.

Belladonna.—This remedy has one characteristic which distinguishes it from all its fellows: *the discharge feels hot to the parts.* The feeling as if the entire pelvic contents would issue from the vulva is not so characteristic, but is important. Nux vomica has the same symptom, and the two remedies are alike in the keen sensitiveness of the special senses, but the nature of the pains and the character of the flow are widely different. The desire for sleep, without being able to get to sleep, the sudden origin and cessation of the pains, and the urticaria during menstruation, are characteristic of Belladonna. Although most frequently used in bright-red but abnormally profuse menses, this remedy will also, sometimes, be of the greatest service when the flow is dark-red and offensive. Carroll Dunham called attention to this fact. "In women apparently healthy, in whom the function of menstruation is in every other respect normal, the flow is sometimes extremely offensive. It has been described to me by the patients and their friends as peculiarly and distressingly offensive. The cases which have come under my observation have been unmarried young women, in good circumstances, and of most exemplary habits in every way. I was led to give Belladonna from the symptom (quoted by Hahnemann from Evers' *Berliner Sammlungen*, iv.) 'offensive metrorrhagia.' The odor ceased to be perceived. No other remedy or treatment had any effect."

Cinnamon.—The flow comes on suddenly, is profuse, and of a bright-red color. It has always done well in my hands, and has several times stopped severe hæmorrhages after other apparently well-selected remedies had failed to make an impression. I have never tried it in the ordinary dark-colored menorrhagia, but I am satisfied that it has a wider field than is generally credited to it.

Hyoscyamus will rarely be needed, and only when indicated by the peculiar mental symptoms. A case of profuse, bright-red menorrhagia, several months after confinement, associated with the immodesty and loquacity occasionally met with in mania arising from functional maladies of the sexual organs in women, was completely relieved by this remedy.

Arnica is useful for women whose menses are habitually premature, and in whom they are now rendered profuse by some shock to the system. The mental condition somewhat resembles that calling for Chamomilla.

Causticum is adapted to women of a scrofulous diathesis whose menses continually delay, but at last come on very profusely. The flow is only in the daytime, and ceases when the patient lies down.

Aloës may be used when the menstrual discharge is deep-red and coagulated, obstinately profuse and exhausting, and accompanied by evidences of general pelvic congestion. It is best suited to women at the change of life.

When the menorrhagia is *more profuse at night* (the reverse of Causticum) the following may be consulted:

Ammonium carb. when the catamenia is premature, profuse, so acrid that the thighs are made sore, and consists of blackish clots.

Magnesium carb. differs from the above only in being delayed instead of premature, and viscid and pitch-like instead of clotted. Both have symptoms of coryza at the menstrual period, marked paleness of the face, and profound lassitude. In the Magnesium patient, when the pains cease the flow comes on, but remits if they return, while the Ammonium patient suffers from violent cholera-like symptoms during the flow. A peculiar feature of this latter remedy is the discharge of blood from the rectum at each period; the pains are mostly right-sided; it is best suited to scrofulous women, who are forever catching cold, while Magnesium is required usually for those with organic uterine disease.

Cyclamen benefits indolent women who complain of a flickering before their eyes during the menses and of a feeling of stupefaction in the brain.

Zincum has this singular characteristic that although the flow is abnormal in frequency and quantity, she feels perfectly well as soon as it sets in and as long as it continues. Before menstruation she is in constant pain in the small of the back, especially about the last lumbar vertebra, worse when sitting, better when walking, and relieved by pressure. Her restlessness is peculiar; she cannot keep her feet still, and she suffers from a variety of hysteric complaints. These conditions all return after menstruation, and with them an irresistible sexual desire, caused by vulval pruritus. Zincum vies with Hamamelis in the varicose diathesis. Varices on the genitals, legs, and elsewhere are the source of the eroticism and of much of her pain; hence the relief from a free catamenial discharge. Zincum cures the varicosis and restores the functional operations of the womb to pristine rectitude.

Coffea has profuse flow of dark blood, and is of great service when indicated by the characteristic nervous symptoms, especially a state of hyperæsthesia, sleeplessness, and a tendency to exaltation.

Among the remedies to be consulted are Calcarea carbonica, Silicea, Kali carb., Thuja, Kreasotum, Borax, Lycopodium, Phosphorus, Stannum, Iodum, Sepia, Carbo veg., Nitric acid, Muriatic acid, Sulphuric acid. Patients of a tuberculous diathesis may be benefited by Calcarea, Silicea, Kali carb., Phosphorus, or Stannum. A study of the totality of symptoms will establish the homœopathicity of the remedy to the case in hand.

Auxiliary Treatment.—The patient, if losing a large quantity of blood, should be laid, without a pillow, flat on a hard mattress, with light covering, in a cool room. It is sometimes well to elevate the pelvis by cushions. If this does not diminish the flow, apply strong ligatures to each of the extremities, and cloths steeped in iced vinegar to the vulva. If this is not sufficient, apply ice to the mouth of the womb, per vaginam, and also over the pubes. Mustard poultices to the breasts have a powerful derivative influence. All else failing, plug the vagina.

DYSMENORRHŒA.

Dysmenorrhœa implies painful menstruation; but, in a broader sense, it includes all pain consequent upon the disorderly performance, by the uterus, of its menstrual duty. This pain may occur concurrent with the catamenia, or it may precede the flow, or linger after that has ceased, or it may return at some inter-menstrual period. It differs widely in character, severity, and intensity, so that hardly two women can be said to suffer alike. In some cases it amounts to little more than a feeling of discomfort, while others roll in agony, and reason itself, for the time being, may be dethroned. Between these two extremes there is every variety of gradation in the suffering experienced. The pain differs as much in time as in intensity. It may precede the flow by two or three hours, and cease when the menses begin; or it may last for days; and in some extreme cases the patient is never free from pain. It may be associated with a profuse or with a scanty flow, more generally with the latter; although it may occur in connection with menses apparently normal in amount.

Dysmenorrhœa occurs from either of three general causes: 1. Changes in the shape or position of the uterus. 2. Congestion in the uterus. 3. Hyperæsthesia of the uterine nerves.

1. Changes in the shape or position of the uterus give rise to *mechanical* or *obstructive dysmenorrhœa*. Under this head, also, are included such congenital defects as preclude a proper menstrual flow. Congenital narrowness of the cervical canal, congenital narrowness of the os externum uteri or of the os internum, particularly the latter, or an infantile uterus, may be the source of the dysmenorrhœa. Flexion of the uterus is a very common cause of this disorder. When the womb is bent upon itself, either with a forward or a backward tilt, the angle of vertical variation will occur generally in the neighborhood of the internal os, though sometimes somewhat below this, and occasionally as low down as the middle distance of the cervical canal. From anatomical reasons, however, in a vast majority of cases the flexion occurs just where the passage is the narrowest, that is at the os internum. As every tube has its greatest carrying power when perfectly straight, and as its drainage power is lowered in geometric proportion with the acuteness of the angle at which it is bent, so the cervical canal can only perform its duty in relieving the uterus of its menstrual accumulation when its axis is concurrent with that of the body of the womb. The tilting forward or backward of the uterine fundus flattens the cervical canal at the point of the angle, and thus diminishes its calibre and its carrying power as a drainage tube. When the flexion becomes considerable, the sides of this passage-way touch each other, and the

obstruction is then complete. Besides, it must be remembered that we are dealing not with an inorganic tube, but with living tissue. At the best, the os internum will admit only a quarter-inch bougie, and rarely that. Ordinarily this is sufficient to permit the passage, in a slow but steady current, of the catamenial products. If the flow is retarded, clots form around the decidual shreds of which the catamenia is largely composed, and these dam up the passage and increase the difficulty. It seems probable that the internal os has a sphincter-like action, which enables it to enlarge its diameter and to permit shreds, and even small clots, to pass without discomfort. But flexion produces pressure on the muscular fibres of whichever happens to be the under side of the curve of the uterus, with consequent hardening or induration. This will manifestly interfere with, or prevent, the free automatic action of the os internum. Moreover, the essential of menstruation, as far as the uterus is concerned, consists in the proliferation and increased vascularity of its mucous lining, its muscular tissue, and all the surrounding parts being, at this time, gorged with blood. This swollen mucous membrane impinges on the bent and distorted outlet, and acts as a valve, readily yielding from outward pressure (as from a sound), but impervious from within. The menses, thus pent up, accumulate within the womb, which naturally rises as it fills, thus straightening itself, so rectifying the obstruction, and permitting the imprisoned products to escape. In these cases, the recumbent position, prone or supine as the circumstances demand, diminishes the flexion, straightens the cervical canal, and removes to that extent the impediment to the escape of the contents of the womb. When, however, the flexion is permitted to persist for a considerable period, the compression and induration at the point of inflection become permanent, and the uterus is unable to thus straighten itself. The emptying process is now very slowly and ineffectually performed, and the catamenia protracted and appallingly painful. These patients pass the entire time either in harrowing expectation or in sufferings *cesse sans cesse*. A veritable stricture of the os internum may sometimes be found in these chronic cases.

Softening or hardening of the uterus are also causes of dysmenorrhœa: the former by permitting pouching, and thereby retention; the latter, by preventing that reasonable increase in the dimension of the cavity of the fundus, at the menstrual period, upon which the painless performance of the catamenial function depends.

The seat of the obstruction in case of dysmenorrhœa has long been in dispute; and even now there are excellent authorities who hold that in a majority of instances it is at the os externum. With this view of the case I cannot agree. In my experience, flexion is not only present in a vast majority of cases of dysmenorrhæa, but it is in most of these the chief cause of the pain. Stricture of the external os, spasmodic or otherwise, does undoubtedly occur, and may in such cases be the only obstacle to a free and painless flow. Stricture of the external os, and diminution in the calibre of the cervical canal, are frequently occasioned by the use of nitrate of silver, or other caustics, in the treatment of diseases of the cervix and canal.

Growths within the uterus are a frequent cause of dysmenorrhœa. A small polypus hanging down against the internal os or within the cervical canal may act as a plug and prevent the flow. Intra-mural fibroid tumors in the anterior wall, or if so placed as to interfere with the integrity of the cervical canal, cause severe dysmenorrhœa.

A transient mechanical cause is the lodgment of hardened clots of inspissated mucus or of false membrane in the cervical canal.

Whatever the cause of the obstruction, the subjective symptoms are much the same in tone, though differing in intensity. At the approach of the menstrual nisus various uncomfortable feelings are experienced, lasting for a variable and indefinite period. During this time the cavity of the uterus is filling with menstrual products, detained therein by the obstruction. The uterine walls are thereby irritated, and contracting pains are excited, which presently become violent expulsive efforts, resembling labor-pains. By this means a portion, or perhaps all, of the retained fluid is expelled, and the patient experiences more or less relief. These attacks are termed "menstrual colic"; and repeat themselves, over and over, until the flow finally ceases.

2. Dysmenorrhœa from congestion may be divided into three stages: congestive, inflammatory, and membranous.

Congestive Dysmenorrhœa implies that at the menstrual period a greater quantity of blood is arrested in the uterine sinuses and adjacent tissues than is requisite for the due fulfilment of function, and that discomfort is thereupon experienced. It is met with most frequently in young and unmarried women, and in plethoric women. It results from general plethora, from a sedentary or too luxurious mode of life, from taking cold, getting wet, or from any cause which disturbs the equilibrium of the circulation. "Young girls of florid complexion and plethoric habits suffer terribly in many cases before their menstruation is regularly established, and often in such cases the same congestive attacks follow them occasionally in after-life. For some time before and after the catamenia appear the suffering is very great; the patient complains of pain across the back, aching of the limbs, weariness, intolerance of light and sound; the face is flushed, the skin hot, the pulse full, bounding, and quick, often upward of one hundred." The flow accompanying this form of dysmenorrhœa is usually very profuse.

Inflammatory Dysmenorrhœa depends upon the existence in the uterus, in the ovaries, or in the subjacent cellular tissue, of an inflammatory process. This may be so slight as to give rise to but very little pain during the inter-menstrual period, but the patient is at no time altogether free from discomfort. During the menstrual epoch the pains increase, but never have the sharpness nor the intensity of the congestive and obstructive varieties. It is rather a dull, aching feeling, beginning several days before the flow, continuing through it without much exacerbation, and for a day or two subsequently. This form of dysmenorrhœa, in some few cases, arises from chronic inflammation of the pelvic peritoneum. This inflammatory process causes plastic exudation over, and thickening of, the covering of the ovary, and the consequent difficult perforation of a Graafian follicle, whence the pain.

Membranous Dysmenorrhœa is that peculiar condition in which the lining of the uterine cavity, instead of being exfoliated, is discharged entire, or in large fragments. This may not occur every month, but only occasionally. In other cases it recurs regularly, though the intervals are likely to be longer than a lunar month. In one case, which I had under observation during the year 1879, the menses returned at intervals of six weeks, and the membrane was thrown off practically in one piece, though torn and slit as if the rupture from the uterine walls had not been simultaneous in all its parts. This lady was of a sanguine-lymphatic temperament, was now twenty-nine years old, had been married seven years, and was the mother of a little girl, born in the third year after marriage. She began to menstruate in her fourteenth year, but the flow was not fully established until two years subsequently. During this period she suffered much from congestive dysmenorrhœa, the flow being profuse, but delaying. From her seventeenth year until after marriage, menstruation was normal in frequency and amount, although always painful. She remained in good health until after the birth of her child; but from that time on menstruation was irregular and painful. The first time the membrane came away entire was after a three months' cessation of the catamenia, during which time she supposed herself *enceinte*, and the discharge was considered a miscarriage. It, however, recurred from that time on with regularity, though at first with variable interval. The pains would begin as in the congestive form, lasting for about forty-eight hours, when a profuse bright-red flow would result. Usually this continued for about twelve hours, and would then suddenly cease. In about two hours, violent, labor-like pains would set in, with profuse hæmorrhage, and the expulsion of the membrane, the flow continuing uninterruptedly for two or more days, and usually ending rather abruptly.

The cause of membranous dysmenorrhœa would seem to be a mild inflammatory process involving the mucous and submucous tissues of the womb, which causes an undue growth at the menstrual period;

for it should be noted that the membrane thus thrown off is not the product of the present catamenial epoch, but of the preceding one. It is expelled in entirety, or in large pieces, probably in consequence of an excess of fibrous tissue, rather than because of its actual bulk. Dr. Beigel* considered that it is caused by pathological changes, in consequence of excessive cell-proliferation. Microscopically he found the normal elements increased in some cases, in others single elements —glands, epithelium—lost or degenerate; in some he found embryonal cellular tissue; in all cases, round free cells. These latter caused the separation. Dr. Gautier† argues that it is a desquamation of the epithelial and sub-epithelial structures analogous to ichthyosis, and suggests that it be termed "uterine ichthyosis" (Hewitt). Below these visual causes, and of which these are but results, is the constitutional one. What this peculiar dyscrasia may be has never been explained; but with this local symptom will be found associated certain general expressions of morbid action which will sufficiently define the case for purposes of prescription; when strictly individualized, these cases are not hard to cure, for they all possess obscure though definite symptoms which point unmistakably to the drug relation.

Membranous dysmenorrhœa, from the concurrent symptoms, and its association with delaying or interrupted menstruation, may be mistaken for abortion—an annoying error for a physician to make in regard to an unmarried patient. It would seem, however, on good authority, that in single women the membrane always comes away in detached fragments, and that it is only in married women that complete casts of the uterus are obtained. Notwithstanding the authorities, I should apply this aphorism with great caution. Relying upon this assertion that the membrane is expelled in its entirety only in the married, Haussman and others have argued that these cases are really abortions. I am satisfied that in the case cited the trouble could not possibly have been due to conception, and there are a number of genuine cases recorded; but it may be that abortions may alternate with membranous discharge, though even this is problematical, as these women, with scarcely an exception, are sterile.

3. Dysmenorrhœa may result from purely nervous and psychical causes, and this is termed neuralgic.

Neuralgic Dysmenorrhœa is the monthly exacerbation of the suffering from an irritable uterus, which latter may be but the expression of a morbid tendency to nervous pains (the neuralgic diathesis) or the result of chlorosis or plethora, or the concomitant of general disease, such as gout or rheumatism. The uterus in health is quite insensible, but the condition here denoted is one of exquisite sensitiveness, which by nervous reflexes occasions suffering in the most distant parts. Upon digital examination (for the speculum is quite out of possibility in these cases), the uterus is found to be extremely sensitive, yet without evidence of congestion, induration, or any change in its structure. The subjective symptoms are not confined to the pubic region, in fact, are usually not severely felt here, but extend upward into the hypogastric, laterally into the groins, downward along the thighs, upward and over the crest of the ilium into the sacral region, and thus passing upward and involving the entire spine and its attachments. Headache, twitchings of the muscles, spasms of organs, or even general convulsions, and every imaginable sensation, may result. During the menstrual period, which usually returns with clock-like regularity, the pains are excruciating, but in the interval there may be merely symptoms of weakness, weariness, and weight. Leucorrhœa is always present, and may vicariously replace the menstrual flux. The monthly paroxysms usually precede the catamenial flow by two or three days, moderate as soon as the flow is well established, and cease with it; but occasionally the suffering is aggravated during the flow or immediately afterward.

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* Archiv. für Gynæk., Band ix., Heft i. (1876).

† Essai de la Pathogénée de la Dysménorrhée membraneuse. Geneva, 1878.

These five classes of cases include all forms of this disorder; but the line of demarcation is not to be drawn rigidly in practice. Obstructions cause congestion, and congestion runs on into inflammation. Inflammation provokes flexion, and this becomes a cause of obstruction. Obstruction, by causing pressure, gives rise to pains of a neuralgic nature, and these in turn cause a determination of blood to the pelvis, and so bring about a condition of chronic congestion. In this way it is usual to find a mingling of these characteristics, to some extent, in cases as they present themselves for treatment, but the cause of the pain, in a majority of the cases, will prove to be associated with more or less retention of the menstrual products beyond the time when they should be naturally voided.

Diagnosis.—Dysmenorrhœa could only be confounded with one other condition—threatened abortion. The pains radiate from the uterine region to the back and loins, as in labor; they are paroxysmal, and often completely intermittent; and they go on increasing in intensity and severity, just like labor-pains; but the history of the case will be determinate. In pregnancy, with rare exceptions, the menses ceased suddenly, and have been absent altogether for one or more periods, previous to which the general health was good and the menses regular; in dysmenorrhœa there has been a succession of similar attacks, and the menses have retained their accustomed rate. An examination of the decidua will determine the presence of products of conception in those cases in which the history is confusing, conflicting, or unattainable.

The **Prognosis**, under homœopathic treatment, is always favorable, except in cases where the pain is caused—as in uterine fibroid—by irremediable organic mischief; and even here the carefully selected remedy will often give great relief from pain, although not staying the progress of the growth.

Treatment.—The treatment of this disorder requires, in a large degree, patience and skill on the part of the practitioner. Surgical interference is sometimes necessary, but much less frequently than is generally supposed. Even congenital defects, so-called, frequently only arrested growth, may often be remedied by the careful therapeutist without recourse to the knife. As homœopathists it behooves us to avail ourselves of the splendid results obtainable by the careful comparison of our cases with the materia medica before resorting to instrumental means, which, even in the hands of the most skilful, is often the gateway to disaster.

Neuralgic Dysmenorrhœa may call for Xanthoxylum, Gelsemium, Viburnum, Caulophyllum, Arsenicum, Ignatia, Tarentula, Asclepias, Cuprum, Hyoscyamus, or Stannum.

Viburnum is adapted to slender, hysterical women, whose pains come on suddenly, who suffer from constant nausea and severe dyspnœa at every menstrual period, and who are easily disturbed by minor events.

Caulophyllum.—The pains are spasmodic, but the flow is normal or scanty, while that of Viburnum is very profuse. Both remedies have copious urination, with cramp-like pains; that of Caulophyllum is straw-colored, and that of Viburnum clear.

Gelsemium.—The patient passes great quantities of limpid urine, and suffers from spasmodic, labor-like pains; these cause dizziness and blurred vision, as if she were in a smoky atmosphere; her muscles seem weak and utterly without power, but she fears to keep still lest her heart may cease to beat.

Xanthoxylum is useful when the neuralgic pains are agonizing, and accompanied with a feeling of numbness down one side of the body, or, instead of numbness, there may be a tingling sensation. Persons of a mercurial disposition, and with irregular menstruation, are most readily amenable to its influence.

Chamomilla, Coffea, or **Ignatia,** may be indicated by their several emotional conditions, which are familiar.

Hamamelis is our best remedy when ovarian neuralgia is the cause of dysmenorrhœa.

Arsenicum is useful when paroxysms of burning, lancinating pains in the uterus and ovaries, hot as fire, are associated with excessive prostration and a cold, clammy skin. She is extremely restless, thirsty, and anxious, and her symptoms are aggravated after midnight, and from then on until morning.

Asclepias is closely affiliated to Caulophyllum, and will sometimes afford relief when that fails.

Cuprum.—When the cramps are very violent, causing her to give vent to piercing shrieks. The pains are accompanied by retching and vomiting, which, singularly, is relieved by drinking cold water.

Stannum is occasionally useful when melancholy precedes and facial neuralgia accompanies the dysmenorrhœa. The Stannum patient has a very weak chest.

Membranous Dysmenorrhœa is benefited by Borax, Ustilago, Cantharides, Rhus tox., Bryonia, Mercurius, Bromium, Kali bichr., Phytolacca, Sabina, or Collinsonia.

Borax is an old-time favorite in uterine disease, being used to ameliorate dysmenorrhœa, facilitate menstruation, and promote parturition. Its value in sterility has been abundantly proven, and as sterility and membranous dysmenorrhœa are here twin conditions, even without clinical verification it might be premised that Borax would prove of value in this disorder.* Borax is especially adapted to sensitive, nervous women who start at the least noise; even the crumpling of a bit of paper grates on her nerves; and who dread a downward motion, as going down stairs, the motion of a rocking-chair or a swing.

Ustilago.—The key-note of this remedy is a soft and tumefied cervix and a patulous os.

Secale is much like Ustilago, but the cervix is hard and stiff, and the os is tightly closed.

Bromium has a strong affinity for false membranes attached to mucous surfaces; it is especially indicated in dysmenorrhœa with loud emissions of flatulence from the vagina.

Consult also, as possibly useful, Cantharides, Rhus tox., Bryonia, Phytolacca, Kali bichrom., and other anti-rheumatic remedies.

Congestive and Inflammatory Dysmenorrhœa often indicates the need of either Belladonna, Ferrum phos., Apis, China, Glonoinum, Cocculus, Pulsatilla, Hepar, Cimicifuga, Nux vom., Lachesis, Helonias, or Trillium.

Belladonna is of great value when the parts are hot, and the pains intolerable; also in the obstructive variety when the uterus is prolapsed. It should be carefully compared with Nux and Pulsatilla. Often only minor symptoms will decide which should be given.

Glonoinum has, like Belladonna, a throbbing headache accompanying the flow, aggravated by noise and motion, and coming on in sudden paroxysms; but the Belladonna cephalalgia is worse in the open air, while that of Glonoinum is better in the outer, cool air.

Cocculus is needed for those cases on the border-land between the neuralgic and congestive types of dysmenorrhœa. The discharge is fitful, scanty, and irregular; and most of her ailments are increased by motion, cold, and contact. In many respects Cocculus resembles Pulsatilla; but the symptoms of the latter are ameliorated by cold and by motion.

Lachesis is closely identified with Cocculus, but finds its chief field of service at the menopause. It has many symptoms in common with Belladonna and Sepia.

Helonias, used continuously for a number of months, will often work wonders in women suffering from passive uterine congestion resulting from over-work on one hand, or from enervating luxury on the other. This remedy works slowly, according to my experience, and requires time to develop its effects.

Trillium is useful in those cases of congestion in which the flow is profuse and bright, and the patient suffers severely across the abdomen.

Obstructive Dysmenorrhœa requires Agnus castus, Lilium tig., Aurum, Baryta, Sepia, Belladonna, Podophyllum, Collinsonia, Thuja, Natrum mur., Conium, Zincum, Causticum, Ipecacuanha, Graphites, Cyclamen, Helonias, Calcarea carb., or Sulphur.

Agnus castus has a wonderful power in dilating an obstructed cervical canal. I have seen it relieve, in an hour or two, the most intense and agonizing pain, and bring on a steady flow when the trouble was due to a constricted or spasmodic cervical canal or os. Sterility, lack of sexual desire, and delaying menstruation, are the associate symptoms. Until the flow sets in, frequent urgent desire to urinate; micturition starts tardily, but is copious.

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* Hahn. Monthly, 1876, p. 523.

Lilium is useful in those cases which are initiated by ovarian irritation. Unless a careful inquiry elicits a history of pain in the ovary antedating the flexion or version, nothing need be expected of this remedy. Cardiac suffering during the menstrual and intermenstrual periods is also a distinguishing peculiarity. The flow ceases when she lies down; is scanty and offensive; is accompanied by bearing down when on her feet, as if the whole pelvic contents were about to drop out from the vagina (Bell., Sep., etc.), and she must put her hand against the vulva to prevent this; it is followed by a bright yellow, excoriating leucorrhœa, which leaves a brown stain on her napkin. I have put on record* cases of this sort in which Lilium made a brilliant cure. But the remedy acts slowly, and must be given time.

Consult, also, Aurum, Baryta, Thuja, Zincum, Causticum, Conium, Helonias, Ipecacuanha.

Auxiliary Treatment.—Hygienic and postural measures and the therapy of heat and electricity alone deserve our attention. The importance of proper diet, regular but moderate exercise, local cleanliness, and the avoidance of all excitements and deleterious influences must be strongly, repeatedly, and continually impressed upon the mind of the patient. Without due attention to these measures the best-selected remedy will fail to cure. In cases of flexion or version posture may do much to relieve discomfort and ameliorate pain. This will be prone, supine, or on the side, according to the direction of the displacement. If the rectum is gorged with hardened and impacted fæces, a soap-and-water enema may give relief by removing pressure upon a swollen and sensitive womb. Distending the bladder by drinking freely of warm fluids sometimes helps to straighten the uterus and induce the flow. Hot water vaginal injections (100°–104° F.) and hot water sitz-baths are serviceable adjuncts. Faradization† in neuralgic and congestive dysmenorrhœa is soothing and beneficial.

DISEASES OF THE UTERUS.

CHANGES IN THE SHAPE AND POSITION OF THE UTERUS.

BY GEORGE WILLIAM WINTERBURN, M.D.

Changes in the shape and position of the uterus may be either physiological or pathological. It is desirable to briefly consider the former as a fitting introduction to a proper comprehension of the latter. The normal, nulliparous uterus in the adult is externally a pear-shaped organ, about two and three-quarter inches in length, two and a quarter broad, and one and a quarter thick; it is situated slightly anterior of the centre of the pelvis, at the summit of the vagina, behind the bladder, and in front of the rectum. The vagina is a slender slit in the perinæum, extending upward parallel to the pelvic brim, surrounded by cellular tissue and furnishing a very important means of support to the uterus. Its anterior and posterior walls are in apposition, and, on cross-section, have an appearance like an H, not an open tube, as generally figured in gynæcological works. For purposes of uterine support the vagina may be considered as a pelvic diaphragm, the uterus being set at almost right angles upon it. The bladder, when empty, lies flat and plate-shaped against the pubes, its anterior and posterior walls in apposition; the uterus, attached by cellular filaments to the lower half of this posterior wall, partakes of its movements, rotating forward or rising vertically as the bladder empties or fills, maintaining meanwhile its natural curve. The condition of the rectum also materially affects the position of the uterus; when filled with fæces it pushes that organ forward and to the right. When we speak, therefore, of the normal position of the uterus, it is premised that the bladder and rectum are empty. The mobility of the uterus is further exhibited by its adapting itself to every changed position of the body. Every movement in respiration, in walking, in exercise or work, standing, sitting, or recumbent, changes the direction of the uterine axis. Not only is the uterus thus dependent upon every motion of every other part of the body, but itself cannot even be said to have a separate existence. The uterus is not an organ in the same sense as is the liver, or stomach, or kidney. For whether we view its vascular or nervous connections, its muscular or mucous tissues, we see how it is enwrapped and involved with all the surrounding structures, and impossible of disassociation. While the uterus is movable, and in a state of health constantly moving, its range of movement is limited in

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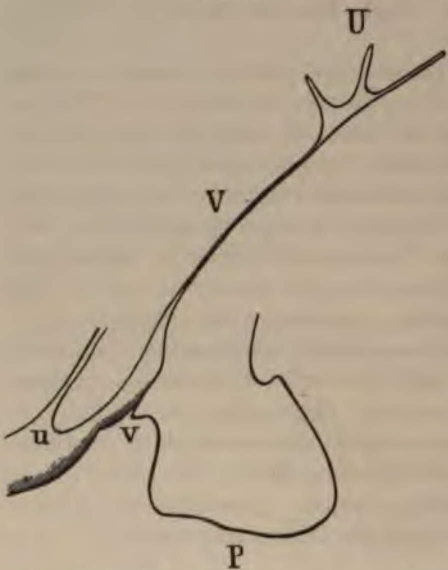
* American Homœopathist, vol. ix.

† Beard and Rockwell (Med. and Surg. Electricity) recommend "placing one pole with firm pressure over the hypogastric region and the other over the lumbar region of the spine," or the application of one pole "to the os by means of an insulated electrode with a metallic bulb, while the other with a broad electrode is applied to the back, or on the hypogastric region, or over one of the ovaries." The former method in virgins is to be preferred to the latter or internal method, and will be found a very valuable means of relief.

FIG. 1.

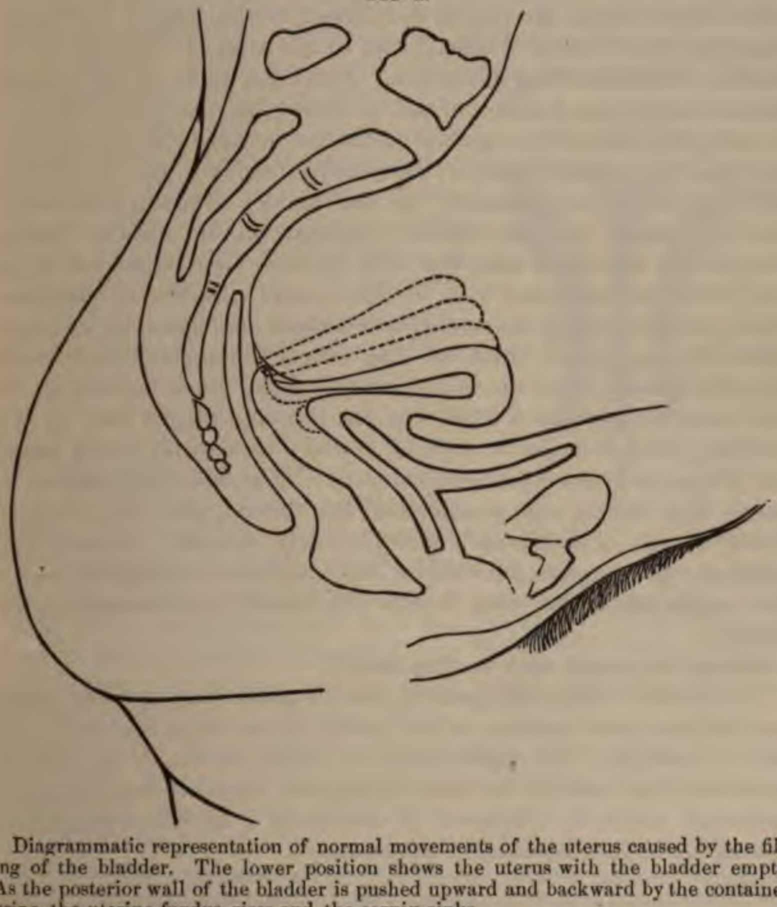


Longitudinal section of vagina, natural size. V. Vagina; U. Uterus; P. Perineum; v. vulva; u. urethra.

a vertical direction to about two inches; anterior or posterior, an inch and a half; lateral, one inch.

The uterus is fixed in position mainly by attachments at its middle part, and when acted upon by any force executes a compound movement. Thus, in the act of straining the uterus is not only forced downward, but also rotates (from the point of attachment) forward, and, being a flexible body, it bends; that is, the downward pressure produces prolapsus, version, and flexion. Here, then, we have the basis of uterine pathology, so far as dislocations and distortions are concerned, conditions which are really only exaggerations of what happens every day in a normal uterus and from which recovery is had instantly so soon as the force ceases to act.

FIG. 2.



Diagrammatic representation of normal movements of the uterus caused by the filling of the bladder. The lower position shows the uterus with the bladder empty. As the posterior wall of the bladder is pushed upward and backward by the contained urine, the uterine fundus rises and the cervix sinks.

The question of the true uterine position has been greatly befogged by the fact that the earlier impressions were derived from the study of the cadaver; and whether these investigations be by ordinary dissection or by the examination of frozen or of spirit-hardened sections, the results are of little value, as there is an undefined *post-mortem* change in the uterine position not yet understood. It is to the living woman, therefore, that we must look for a solution of the question: what is the normal position of the uterus? Here again we are met with an obstacle, in that every effort to determine how the uterus is placed will in some degree alter its relation and position. The literature on this subject is various and voluminous; and as space will not permit even a cursory review here of the many contentions which during the past half century have been put forth in support of radically diverse views, the reader is referred to the papers of Foster,* Claudius,† and Van de Warker,‡ and to the Atlas of Braune, for the details of this interesting discussion. There can be, in the light of our present knowledge, it seems to me, no doubt that the uterus lies in a forward direction, with a narrow cul-de-sac between its anterior surface and the posterior wall of the (empty) bladder, into which there may drop a coil of intestine. As the bladder fills, the intestine is pushed upward, and the bladder impinges on the uterine fundus. This view is dissonant with that held by most anatomists, but in accord with that accepted now by the greater number of clinicians. Most gynæcologists spend considerable effort and space in trying to define the exact angle which the long axis of the uterus should make with the horizon when the woman stands erect; this is useless, for the uterus never maintains a fixed relation with anything as long as it is healthy; when it ceases to respond to every movement, it has passed out of a normal into a pathological state. Thus Schultze § figures the uterus with its long axis parallel with the horizon, while the oft-reproduced diagram of Kohlrausch shows it nearly vertical. To prove their position, one depresses the bladder and lengthens the posterior wall of the vagina, while the other figures the bladder as enormously distended.

Briefly the matter may be thus stated:

The normal uterus tilts forward, but has great mobility. The uterus and bladder move together as one organ, except when the movement of each is slight. The angle which the uterus makes to the horizon is variable, and cannot be stated in degrees; however interesting in a structural sense, for purposes of treatment a further extension of knowledge in this direction is unnecessary.

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* A Contribution to the Topographical Anatomy of the Uterus and its Surroundings. Amer. Jour. of Obstetrics, vol. xiii., p. 30.

† On the Position of the Uterus. Med. Times and Gaz., 1865, p. 5.

‡ Normal Position and Movements of the Unimpregnated Uterus. Amer. Jour. of Obstetrics, vol. ix., p. 314.

§ Archiv f. Gynäk., Band ix., S. 262.

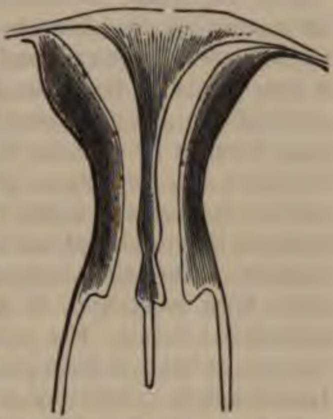
Our subject divides naturally into three parts, Deformities, Dislocations, and Distortions. The first embraces all cases of arrested development or of eccentric growth; the second, abnormal positions of a once healthy uterus; and the third, alterations in shape as well as in position.

Deformity in the Uterus.

The uterine deformities are Malformations, Defects, and Stenoses.

Malformations arise from arrest of development in the fœtus. At about the ninth week of fœtal life, from each nascent ovary there descends what is at first a solid cord, which inserts itself into the urinary bladder at the top of the urogenital sinus. These cords grow, become tubes (ducts of Müller), and gradually unite at their lower extremity, the union extending upward, and the septum disappearing. The upper ends become fimbriate, this section forming the Fallopian tubes; the next lower portion swells out into the fundus; then comes the cervical canal, and the lowest portion forms the vagina. Müller's ducts may, one or both, be absent or but partially developed. If both are absent, there can be no vagina or uterus. If both ducts are present, they may fail to unite, or they may unite externally and the septum not be absorbed. This would cause either a double vagina, each with a separate (unicornuited) uterus; or there might be a single vagina and a double uterus, each more or less perfect, but having only one Fallopian tube; or, there might be a double vagina and a single uterus, as different portions of the septum are, or are not, absorbed. If only one duct of Müller develop, there will be but one simple unicorn uterus. Such a uterus may perform all its functions normally, and even labor may progress without hindrance or difficulty. Again, malformation may arise in tubes which have perfectly united, but in some part of the length of which development is subsequently arrested. Thus, the portions which are to form the vagina and the Fallopian tubes may go on to perfection, but the intervening uterus remain rudimentary. A solid uterus of this kind is by no means rare.

FIG. 3.



Diagrammatic representation of a uterus externally perfect, but with the septum persisting. Either half may become pregnant. Several interesting instances of this have been recently reported in medical journals.

Defect in the uterus is more common than malformation. The uterus is, probably, never completely absent, except in those cases in which every trace of internal genitals is wanting. It may exist merely as a transverse band of muscular fibres; or as a hollow body, more or less approximating its normal shape; or it may be quite properly shaped, but not larger than a bean. Hypoplasia of the uterus may be associated with diminutive heart or with general hypoplasia of the vascular system. More commonly it arises at puberty, from some dyscrasia, not recognized, whereby the uterus fails to develop in size and function, and remains infantile. In this latter case, menstruation does not ensue; but, when the hypoplasia is a part of a general characteristic, the flow may be regular, but is necessarily painful. Such a uterus is defective in muscular fibre, and easily becomes distorted. Small uteri are almost invariably anteflexed.

Stenoses of the uterus may involve the whole canal or either os, and may be congenital or acquired.

Dislocations of the Uterus.

The very great susceptibility, aptitude, and capacity of the womb for movement, its inherent dependence upon all the pelvic viscera for its postural rectitude and its monthly crises of congestion, render it very liable to displacement, and make this among the most frequent of its many derangements. The uterus may move in any direction; upward or downward, forward or backward, or to either side. It moves upward, physiologically during pregnancy, and pathologically as the result of morbid growths within, or attached to, its walls. It moves downward, physiologically, when walking or standing, from pressure on the abdominal parietes, and during labor; and, pathologically, from relaxation of its supports, constitutional defects, and mechanical causes. For purposes of clinical study we recognize five varieties of uterine dislocation: Prolapsus, Anteversion, Retroversion, Lateroversion, and Inversion.

Prolapsus Uteri, or falling of the womb, varies in degree from a slight settling down upon the upper rim of the vagina to a complete extrusion beyond the vulva. The intimate connection of the uterus with all the adjacent organs necessarily implies that any considerable descent of that viscus will entail more or less displacement of these also. For this reason prolapsus of the uterus is rarely a simple disorder, the vagina, bladder, and rectum being in some degree involved. The trouble may originate in the uterus or in the vagina. If vaginal, it is most likely to occur after parturition. During labor the anterior vaginal wall is compressed and shortened, and, if the labor has been severe, loosened from its attachments. This is partly overcome subsequently, but some weakness of the anterior wall remains. Normally, the anterior wall of the uterus rests upon the posterior, as I have already explained. But if rupture of the perinæum has occurred during the labor, the posterior wall becomes vertical, and the anterior, having lost its support, descends, and the bladder pushes down into the space left vacant.

This descending wall naturally becomes hyperæmic and thence hypertrophic, and sinks lower, dragging the uterus with it. The increasing traction impedes the return-flow of the blood, and so still further congests the vaginal wall. This process continues until, completely everted, the wall lies beyond the vulva. In this hyperæmia the connecting parts will partake, and the uterine cervix becomes thickened and lengthened, sometimes to an extraordinary extent. Necessarily, the posterior wall is also dragged down by the traction, and all the tissues become swollen, and finally indurated. The lower segment of the bladder, dragged down by the traction, and pushed down by the descending uterus, appears at the vulva as a fluctuating tumor (cystocele). In these cases the uterus is bent forward in extreme. Such a uterine position will sometimes cause cystocele, even when the perinæum is sound.

The prolapse may be due primarily to the condition of the uterus itself. After parturition the uterus remains for a long time hyperæmic. While thus unduly large and weighty, its peritoneal ligaments, which are themselves undergoing involution, may not be able to keep it in its place, and it sags down on the vagina. If it is in its normal axis, it will rotate forward on the bladder; but if it is vertical, it can easily slip downward, carrying the upper portion of the vagina with it. A sudden jar, misstep, or fall would bring the uterine cervix down to the vulva, or beyond it, while the vagina would be rolled completely inside out. Such an extreme case is called *Procidentia.* The majority of cases are due to a combination of these causes, rather than to one alone; the vagina is lax, and fails in its duty as a pelvic diaphragm, the perinæum is weak if not ruptured, the uterus is unable to return to its proper plane at right-angle with the vagina, remains nearly vertical, the peritoneum and its attachments fail to involute, and it needs now but some accident, lifting a weight, a sudden step downward, straining at defecation, to make the uterus glide down out of place.

It is not alone the woman who has borne children that is liable to uterine prolapse. Young women suffering from lingering disease or convalescing from severe fevers, are in a condition which predisposes, upon any sudden straining, to a descent of the uterus. Other causes are: abdominal tumors, crowding down upon the uterus, excessive omental fat, ascites, intra-mural uterine growths, and dilatation of the vagina by pessaries. Occupation is an important factor in causing uterine prolapse. Shop-girls, cooks, laundresses, and others who stand all day, are prone to this disorder. Persons who have been stout and have become thin, as they grow older, are apt to suffer from prolapse.

While violent exertion may at any time produce instantaneous prolapse, even in those previously healthy, it is not apt to come on save as a slow and insidious process. A strain, a fall, or an accident of some sort, causes the uterus to lose its normal forward tilt, and perhaps to press somewhat upon the rectum. This causes difficulty in defecation, and consequently straining, by which the pelvic contents are pressed downward and the uterine displacement is increased. This again still further impedes the action of the bowels, and so the action and reaction goes on until the uterus is forced down upon the vulva.

The tumor appearing at the vulva in cases of prolapse may then be either an hypertrophied anterior vaginal wall, the lower segment of the bladder (cystocele), the uterine cervix, or, in procidentia, the entire uterus enwrapped in the vagina, which is generally ulcerated. Beside these, a portion of the rectum may protrude (rectocele) when the perinæum is torn and the uterus rotated very decidedly backward.

Hypertrophic elongation of the cervix is a form of prolapse, although differing essentially from the preceding. It was first intelligently described by Huguier,* in 1859, and consists of two varieties: (1), hypertrophy of the portion of the cervix within the vagina; and (2), elongation of that part above the vaginal fold. In the first case the bladder is not usually involved, but in the second the bladder will also be found prolapsed. The body of the uterus may remain in its normal pelvic position, while the os uteri protrudes beyond the vulva. In some cases the cervical canal may be four, or more, inches in length, and the protruding mass, if œdematous, may be nearly as large as a fœtal head. If the cervix is considerably elongated, all the adjacent tissues will also be greatly increased in dimension. It is probable that, either from the pressure of the anteverted uterus or from some slight deficiency in the perinæum, the bladder first descends, and the primary effect of this descent is to stretch the connective tissue binding the bladder to the uterus. This results in hypertrophy of the median portion of the cervix. Those women who stand a great portion of every day, such as laundresses and cooks, are more likely to have elongation of the intra-vaginal portion. If the cervix is exposed beyond the vulva, it becomes dry, hard, and leathery, because no longer bathed by the vaginal secretions; abrasions are likely to occur from friction, and ulceration is frequent.

Symptoms.—The amount and character of the pain experienced is variable and somewhat in proportion to the suddenness of the attack. While sudden prolapse may occur without special pain, usually the patient suffers excruciatingly, and even syncope may ensue. If the prolapse comes on more gradually, the woman will complain of pain in the abdomen, occasioned by traction upon the peritoneal attachments, and of a bearing-down sensation caused by the impinging of the uterus upon the vaginal walls. Menstrual abnormalities are not characteristic of prolapse, and the monthly flux continues as usual. Pregnancy may occur, though it is not probable, when the cervix is much hypertrophied. When it does occur, the uterus gradually ascends into the abdomen, and the case is at least temporarily cured. Careful treatment during the lying-in period may make this improvement permanent.

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* Mém. de l'Académ. Imp. de Méd., tome xxiii.

Various secondary effects result from prolapse. There is dysuria, due to the cystocele. Even if the latter be inconsiderable, a small portion of the urine will remain unevacuated, and chronic cystitis results. Constipation is often a secondary effect, even without rectocele, and with this latter complication defecation often becomes extremely difficult and painful. If the prolapse protrudes beyond the vulva, locomotion is seriously interfered with, and may become impossible. Even the strictest cleanliness will not always prevent inflammation, profuse leucorrhœa, and ulceration. Œdema may so distend the tumor as to cause strangulation, followed by gangrene.

Diagnosis.—The differential diagnosis between prolapse of the uterus and of other tumors appearing at the vulva is important, and is easily made. A polypus might be mistaken for an hypertrophy of the vaginal portion of the cervix, but only in the hands of a careless practitioner. Hewitt mentions a case in which a lady was treated for prolapse and made to wear a pessary for several months, when the real trouble was a well-marked specimen of polypus, attached by a slender pedicle to the interior of the cervix uteri.

The determination of the degree and form of the uterine prolapse is easily made by inspection, palpation, and exploration. All cases of prolapse have this in common that the os uteri is the lowest point; but in other respects they vary greatly. In incomplete prolapse the examination should be made in the erect position, the operator seated on a low chair in front of the patient. On inserting the index finger, and causing the woman to bear down, if a conical, firm, smooth projection is felt near the vulva or beyond it, with the os uteri at its extremity or near by, the case is one of hypertrophy and elongation of the cervix. In these cases the vagina remains practically unaltered, and the *cul-de-sac* will be found at normal height, but the uterine neck may vary much in shape. The hypertrophy may be confined to one lip, which is enormously swollen; or the os may be badly fissured or ulcerated. But its general shape will be maintained, and this, with its firmness of structure, will distinguish it from other growths which might be found in the vagina. If, with the above condition, the vagina be likewise prolapsed, and a soft tumor be felt in front (the bladder) and a smaller tumor behind (the rectum), with the os uteri between, the case is probably an hypertrophy of the supravaginal portion of the cervix. This may be subsequently verified by the use of the uterine sound, which determines the distance from the os uteri to the dome of the fundus. As, however, in some cases the uterus, though prolapsed, is impregnate, care must be used to determine the non-existence of this condition before inserting the sound.

To indicate the mobility of the uterus, slight traction may be made upon the vaginal wall, but not sufficient to cause pain. After a thorough examination has been made in the erect position, the patient then assumes the recumbent posture, and a combined examination of the bladder, vagina, uterus, and rectum, as to their size, mobility, form, and relative position, will determine the character and extent of the mischief and the possibility of the reposition of the uterus by surgical or therapeutic means.

Treatment.—The preventive treatment of prolapse of the uterus includes the correct management of labor and of the puerperal stage. Prevention of this condition in the nulliparous hardly comes within the scope of professional supervision, though it is well to caution young girls in enfeebled health, or just convalescing from serious illness, of the danger of displacements to which heavy lifting, undue straining, or continued standing may subject them. Prophylaxis is more under the control of the practitioner in the puerperium. Perineal lacerations rarely occur except as the result of haste, carelessness, or ignorance on the part of the attendant. Even in women who are primiparous at an advanced age, or who are of extreme youth, the perinæum need not be ruptured unless there be coexisting deformity. Properly selected homœopathic medication, absolute exclusion of all other interests, and complete devotion to the case in hand, time and patience, and skilful instrumental aid at the proper moment will bring every case to a satisfactory conclusion. After a not inconsiderable experience, embracing, it would seem, every conceivable variety of difficulty, in cases ranging in age from the immature child of fourteen to the rigid-fibred primipara of forty, I have yet to see, in my own direct practice, the first case of ruptured perinæum, beyond such trifling nicks as do not affect the integrity of the posterior vaginal wall. If perineal laceration should occur from narrowness of the pelvic outlet, or other cause, the mischief should be repaired at once by stitches passing deeply into the tissue, and set at sufficient distance back from the edge of the tear. The knees should be brought together and tied; the bladder emptied by catheter for some days; easy defecation provided for, by the use of the properly selected remedy, and the vagina stimulated and cleansed by lukewarm, non-medicated injections. In any case, straining to pass urine or fæces must be prohibited and the undue accumulation of either prevented. Nor will the physician need to use catheter or enema if the case is carefully managed, and untoward symptoms are met promptly by their similimum. All inflammations disturbing the involution of the uterus, vagina, broad ligaments, and peritoneum must be carefully treated, and if bearing-down or other symptoms arise, a searching examination should be made, and the proper homœopathic remedy administered. In this way an incipient cystocele or rectocele may be positively cured without resort to elytrorrhaphy, and thus prophylactically prevent the uterine prolapse which would otherwise develop. Elytrorrhaphy is a simple and generally harmless operation which is performed as follows: An oval of the mucous surface, directly over the protrusion, an inch or more in length, according to the size of the cystocele, is freshened, and the edges brought together and fastened by sutures of strong silk thread.

Where prolapse of the uterus already exists, either as the result of child-bearing or from other cause, the treatment may be surgical or medical, according to the experience, knowledge, and inclination of the practitioner. Surgical treatment includes operations for the restoration of a destroyed perinæum, for the reduction of cystocele or rectocele, for forming a new posterior vaginal wall, for reducing the hypertrophied anterior vaginal wall, for shortening an elongated cervix, and the adaptation of some form of sustaining pessary. Repair of the perinæum and the formation of a new posterior vaginal wall is performed in a great variety of ways, every gynæcologist having his favorite method. None are perfectly satisfactory, but the following is

FIG. 4.

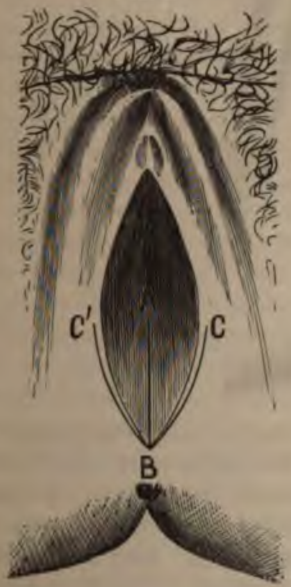
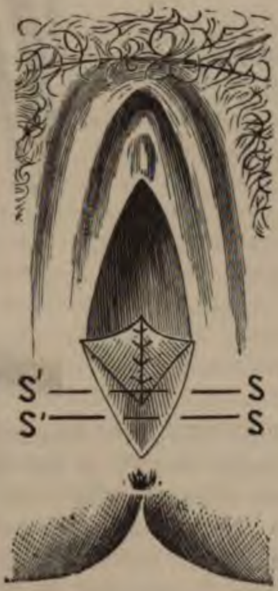
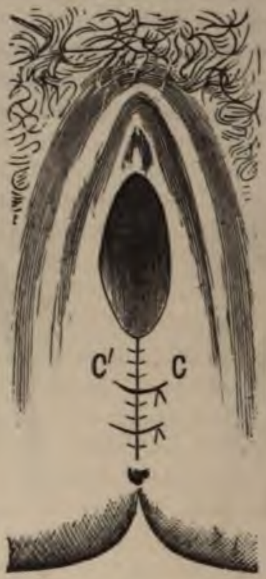


FIG. 5.



simple, requires no special surgical proficiency, and is as useful as any of the more elaborate methods. An incision is made along the posterior vaginal wall and ruptured perinæum from A to B, Fig. 4. From B the knife is carried upward on each side along the inner surface of the labium minor to C. Two triangular flaps are thus formed which are dissected upward until their edges lie as in Fig. 5, where they are joined by silk sutures, the knots being tied on the vaginal surface. Two deep sutures are inserted as in Fig. 5, S S,′ and the raw surfaces left by the flaps are drawn together. A number of small sutures unite the skin-edges, and the completed operation is seen at Fig. 6.

FIG. 6.



Various operations for narrowing the vagina and thus presenting a mechanical obstacle to the descent of the uterus have been devised. That by Hegar is easily executed and answers the purpose: A triangle on the surface of the posterior vaginal wall is freshened, the apex close to the os uteri, and extending to the perinæum. Just so much tissue is to be removed as will give a rawness. The two edges are brought together and united by sutures passing deeply into the tissues. The patient must be kept in bed for twenty-one days, and it is better to allow the sutures to suppurate out, as this renders the cicatrix firmer and less likely to break down subsequently. After this operation the vagina is rigid and very narrow, connection takes place with difficulty, and subsequent labors are serious and probably dangerous. After all this trouble, the vagina may continue to stretch, and the prolapse recur. The rest in bed, hæmorrhage from the wound, and restoration of the uterus to its normal position, all have an atrophying influence on the hypertrophied tissues, but the operation does nothing to alter the dyscrasia upon which the original lesion depended, and leaves the patient really not very much better for all her suffering.

If the case is one of elongated cervix, the vaginal portion may be excised. This not only gets rid of the tissue cut off, but the whole cervix and uterus involute, and frequently return approximately to the normal size. When the hypertrophy is confined to the supra-vaginal portion of the cervix, this operation cannot be performed.

In a large majority of cases of prolapse help is sought by the use of pessaries. A pessary may be of use in either of three ways: (1), It may be so voluminous as to stretch the wall of the vagina and press it snugly against the other pelvic contents, or (2), it lies along the axis of the vagina, giving it stability and enabling it to support the weight of the uterus, or (3), it consists of a uterine supporter kept in place by external bandages, thus relieving the vagina of the weight of the uterus.

All pessaries are objectionable, and those which forcibly dilate the vagina are inexcusable; nevertheless, patients are often relieved by their use, and doubtless occasionally cured. On the other hand, it must be admitted that very serious consequences frequently follow their use even in the hands of the most skilful and experienced gynæcologists, and the constant demand for something new in form or style, and the readiness with which new shapes are accepted, proves how unsatisfactory previous experience has been. Although pessaries act often palliatively, or produce such a change in the more distressing symptoms as lead both patient and physician to hope for radical benefit, the entire theory upon which their use is based is a mortifying commentary on the blind following of precedent so common in our profession. These mechanical contrivances are designed to act as a scaffold upon which the uterus can rest. The upward and inward pressure which they produce when skilfully adjusted at first induces a very comfortable feeling, similar to that caused by the obstetric bandage when snugly applied after confinement.

This immediate and apparently good result is well calculated to mislead as to the ultimate consequences. This relief is not confined to the pelvis, but the abdominal viscera are sustained, the sense of dragging is lost, while the respiratory muscles, freed from the unnatural strain to which they have been subjected, move freely and respiration becomes easy and natural. But the relief is mechanical, not vital, and, therefore, unnatural and inhibitory. Muscles act only under the incentive of compulsion, and when the necessity of action is withdrawn they become lax, atrophic, and useless. The victim of this form of treatment, unless other influences are brought to bear which more than overbalance the injury inflicted by the mechanical support, soon finds herself utterly dependent upon it and unable to get about without. A rational treatment, on the other hand, seeks to arouse vital action, not to suppress it; aims to encourage the supporting muscles to do their duty, not to supplant them by foreign mechanism; insists upon restoration of all the involved organs, both functionally and positionally, instead of providing mere temporary makeshifts, such as all mechanical supports necessarily are. The foreign body in the vagina not only deprives the uterus of such remnant of natural support as is still left to it, instead of restoring it, not only prevents nutrition of the parts and the full play of abdominal and respiratory movements, not only displaces the vaginal walls by its mere presence, and thus displaces every other pelvic viscus, but it prevents those natural oscillating and reciprocal movements of the uterus which are essential to its nature. When it is generally recognized that the primary disease consists in the weakness of those parts upon which the uterus and its appendages depend for support, and that the prolapse is incidental and secondary, it will be acknowledged that whenever the treatment is based on mechanical supports the real disease is concealed rather than cured. Not only is the pessary unscientific in theory, but, as ordinarily used, it is provocative of much mischief. Vesico-vaginal fistulæ, and other ulcerations, frequently result when pessaries are left *in situ* for months at a time. Dr. Marion Sims and others have mentioned many cases. The vaginal secretions are viscid, and incline to adhere to the instrument. This deposit does harm in two ways. It forms a roughened crust upon the pessary, which profoundly irritates the mucous lining of the vagina; this latter determines an undue flow of blood towards the parts, involving ultimately all the surrounding tissues in the congestion, setting up a proliferation of cell-growth which not only causes a loss of much vital power, but gives rise to serious organic changes. Or, this deposit decomposes, and the products of this decomposition are absorbed, thus adding a new and very grave complication. The use of a pessary is often provocative of flexion of the uterus, a worse condition than the original prolapse; for, while it supports the uterus from below, it cannot in any way modify the pressure from above which is crushing the uterus downward; and that organ, acted upon by these two opposing forces, bends upon itself, a condition which often becomes permanent and irremediable. While, therefore, a pessary may be of temporary benefit, and may even be used with advantage for a brief period in certain rare cases, the objections to every form of mechanical support are radical and cannot be gainsaid. The only rational treatment, and the only one meriting our attention, is that which restores the efficiency of the natural supports of the uterus.

Prolapse of the uterus being then but the local manifestation of a systemic disturbance cannot be cured by local means. Permanent curative effects will follow the administration of the properly selected homœopathic remedy, as has been demonstrated in a multitude of cases, and the true remedy in any case can only be known after all the general as well as local symptoms have been duly observed and considered.

A frequent symptom in these cases is a pressure downward, as if the abdominal or pelvic viscera would be forced out. This symptom is possessed in common by Belladonna, Sepia, Lilium tigr., Antimonium crud., Ustilago, Nitric acid, Natrum carb., Pulsatilla, Nux vomica, and Phodophyllum.

Belladonna is capable of effecting a radical cure even in cases which have persisted for many years. Its appropriateness in affections of the bladder and urethra, which are so generally involved in prolapsus uteri, is still further evidence of its power to cover the whole case. The bearing-down feeling in the pelvis is worse when the patient sits bent over and while walking (rapid walking is impossible), but is better when she sits upright, when she stands, and when she moves gently about. The pain is aggravated by the least jar of her bed or chair. The pains come on suddenly, persist indefinitely, and cease as unexpectedly as they began; but they are apt to be most frequent and most severe in the afternoon and about midnight. Not only is the uterine region very sensitive, but the sacrum and coccyx are extremely painful. She cannot lie at all on her back, and turns from side to side amid great pain. The ischia seem painful when sitting, as though insufficiently covered with flesh; but actual pressure relieves. Belladonna is especially suitable to plethoric, jovial women, with delicate skin and fair complexion; to women with prolapsus at the climacteric or after parturition; and to recent cases produced by a too free flow of blood to the pelvic organs. In these latter cases there are usually spasms and rigidity of the limbs; restlessness, sensitiveness, and irritability; burning pressure in the uterus, with dryness of the vagina; increased sexual desire in the evening, but aversion to an embrace in the morning; pains go straight through the pelvis from front to back, and the reverse; and the menses are too early, very profuse, hot, and bright-red. Occasionally the discharge is bright-red, with dark, offensive clots; or, thick, dark-red, and decomposed. In either the chronic or recent form of prolapse the desire to sleep, with inability to do so, is a prime characteristic.

Sepia has many symptoms in common with Belladonna, beside the feeling of bearing-down. It is to be preferred when this symptom is relieved by lying down, returns on sitting up, is aggravated by standing, and is almost unbearable when walking. She feels that she must cross her legs to keep the womb from dropping out of the vagina. The pains pass from behind around the circumference of the pelvis to the vulva, not straight through as in Belladonna. There is usually present a peculiar "all-gone" sensation in the pit of the stomach, almost causing faintness, relieved by lying down and by eating. This, with the irritability of the bladder, the flashes of heat, and the leucorrhœa are diagnostic. The disposition is moody and apathetic, depressed and anxious, with a sense of helplessness amounting almost to terror. Like the Pulsatilla patient, she has frequent attacks of weeping, though the despair is more profound. Sepia is said to act best in chronic cases, in prolapse during pregnancy, after parturition, and while nursing; in women of delicate constitution, fine skin, and with dark hair. But I have seen remarkable results in recent cases when there was great tenderness of the vagina, coition very painful, pain in the sacrum extending down the thighs, oppressed breathing, over-sensitiveness to noise at the menstrual period, and the catamenia too frequent. Sepia is one of our best remedies in induration and elongation of the cervix; in hypertrophic enlargement of the vulva caused by descent of the vagina, and in that complete eversion of the vaginal walls which is known as procidentia. It follows well after Pulsatilla. By this is not meant that they may be alternated, for when so given they mutually antidote each other; but that, being in many respects closely alike, Sepia will often finish a case satisfactorily which at first called most distinctly for Pulsatilla. Sepia has cured epithelioma on the lip, and should be remembered in similar conditions coincident with prolapse.

Lilium tigrinum is a very valuable remedy in prolapse. The patient, when on her feet, has a bearing-down sensation, as though the whole pelvic contents would issue from the vagina, if not prevented by firm pressure with the hand against the vulva. This sensation disappears upon sitting down. In the earlier stages of prolapse from subinvolution of the uterus and its appendages after parturition, Lilium will hasten the process of involution and restore the uterus to its normal position. The pressure in the vagina is accompanied with a pain extending from the top of the sacrum around the hips. All the pelvic contents seem swollen and tender, and the slightest jar or pressure causes pain. The ovaries, rectum, and bladder are usually all involved. Urination is frequent, with burning in the urethra after every discharge. The urine is scanty, hot, and deposits a thick sediment. The pressure in the rectum causes an almost constant desire for stool. Sharp pains in the ovarian region are characteristic. In fact, I have never been able to obtain satisfactory results from this remedy except the ovaries were neuralgic or inflamed. The ovarian trouble antedates the urine. If the menses are scanty, dark, ill-smelling, and flow only while she is moving about, and are followed by a profuse, yellow, excoriating leucorrhœa, Lilium will cure these symptoms and the prolapse as well. These cases usually show great irritation of the nervous system, evidenced by pains here and there, fluttering of the heart, trembling and weakness. The mental condition is one of aimless hurry, she walks to and fro unable to settle herself down to any serious employment, imagines she is incurable, is impatient, fretful, and low-spirited. In some cases curious alternations of opposite mental states occur. The Lilium patient is worse in the afternoon (Sepia brighter in the afternoon), and thence on to midnight, after which she is better until the next afternoon, when all the symptoms of the previous day return in the same order. Lilium is a slow-acting remedy, and even when well selected is tardy in showing its curative action.

Antimonium crudum, though not of as frequent application as either of the remedies mentioned, is well adapted to elderly women with gastric or hæmorrhoidal complaints, who have long suffered from an acrid, watery leucorrhœa, or with a similar discharge from an ulcerated cervix. It will also benefit young girls who have prolapse at the menstrual period, or after suppressed menstruation, with violent pain in the small of the back when rising from a seat. As in Lilium, the bearing-down sensation is associated with intense tenderness in the ovaries and irritation in the rectum, but Antimonium will rarely, if ever, be the true remedy unless there is marked gastric derangement.

Ustilago is a useful remedy in elongation and hypertrophy of the cervix. The patient complains of a constant aching distress in the mouth of the womb. The bearing-down sensation is intermittent, is often associated with a similar feeling in the left ovary, which is very tender to the touch, or with a dragging backache. Ustilago seems to act best on tall, slender women of the consumptive type and on lymphatic women with clear, white skin.

Nitric acid is probably rarely called for, save in the mercurial and syphilitic dyscrasiæ. It is especially suitable for elderly women and lean brunettes. The rectum and vagina are both prolapsed, and there is a burning sensation in both. The urine has an intolerable strong odor. The patient is extremely debilitated, very despondent, easily vexed by mere trifles, has great aversion to all mental exertion, and, while constantly drowsy, is unrefreshed by sleep. Nitric acid will bring relief when prolapse is associated with uterine cancer, syphilitic excrescences on the cervix, or aphthous ulcers on the os or in the vagina, if the general symptoms correspond with the pathogenesis of this remedy. In two desperate cases where the vital powers of the patients were exhausted I have seen the administration of Nitric acid followed by the gradual subsidence of all the alarming symptoms, and a tardy but positive return to health.

Natrum carbonicum has not many well-defined symptoms in prolapse, save the one held in common by all this group of remedies. Raue mentions it as useful in indurated cervix. It acts best in women who are pallid, but not from disease; who take cold easily; who have "aversion to men" and society; whose symptoms mostly appear while at rest, and disappear on motion, but whom exertion wearies greatly, and whose sufferings are most violent during full moon.

Pulsatilla has this same symptom of downward pressure, which is worse when lying down, aggravated by heat, and ameliorated in the open air. There is a sense of pressure on the bladder, urination is frequent, copious, but not attended by strangury. There is not the hyperæmia of Belladonna, the atonic relaxation of the ligaments of Sepia, nor the uterine induration of Natrum, but rather an hydræmic tendency, as illustrated by the copious bland leucorrhœa, and the heavy, dead pressure, as from a stone, in the pelvis. The pains are variable, and often transitory, but they increase in severity toward nightfall, and culminate before midnight. As the pains increase, the peculiar mental despondency and inclination to tears increases also, and as the pains diminish the spirits improve. Next to the peculiarities of disposition, the characteristics of sleep are most pathogenetic, and when doubt arises in the choice of the remedy, the quality and time of sleep will often decide. The Pulsatilla patient is sleepy in the afternoon, but wide awake in the evening. Even when she goes to bed she does not fall asleep for some time, and then it is a troubled, restless, broken series of naps. Sound sleep does not come until the morning hours, and from this she awakes languid and unrefreshed. The Sepia patient may be wakeful and restless, but she gets her best sleep in the forepart of the night. All the Sepia patient's sufferings are exaggerated before menstruation, but the Pulsatilla patient is worse during menstruation. The Belladonna patient also awakes in the morning unrefreshed, after a troubled, frightened, dreamful sleep, but she has none of the evening brilliancy of fancy and clearness of thought of Pulsatilla; she is sleepy, but cannot sleep. A marked peculiarity of Pulsatilla pains is, that they are often confined to one side of the body. Besides the remedies named, Murex and Cyclamen are close analogues in uterine complaint.

Nux vomica is in many respects the opposite of Pulsatilla, although they have both this feeling of bearing down; but under Nux the pressure is more in the back, with irritable rectum and ineffectual urging to stool. The pain in the back is severe, and she cannot turn over in bed without sitting up. When standing, the uterus seems to sink down with every motion; relieved by lying on the left side. The prolapse was occasioned by lifting, straining, sexual excesses, or after abortion. The symptoms are worse in the morning, are aggravated by motion, exertion, cool air, and relieved by warmth and rest (contra Pulsatilla). The Nux patient is prone to fall asleep in her chair in the early evening, and on going to bed sleeps heavily until 3 A.M., when she lies in a semi-conscious state until it is time to rise. The Pulsatilla patient is languid in the morning; the Nux tired and irritable, and often with a headache. Nux, though not very frequently indicated, is at times able to cure cases of very long standing.

Podophyllum has cured cases of prolapse of vagina and rectum following parturition and exhausting diseases. The sensation as if the uterus would protrude is more marked at stool, and is often accompanied with actual protrusion of the rectum. The labia, also, are swollen and painful. The pain in the lumbar region is severe and is aggravated by standing, walking, or manual exertion. This and the prolapsed condition are relieved by lying down.

For prolapse occurring suddenly, Aconite, Arnica, or Aurum.

For prolapse after parturition, Belladonna, Nux vomica, Podophyllum, Rhus, Secale.

For prolapse after serious illness, China, Ferrum, Secale.

For prolapse after cessation of menses, Agaricus, Kreasote, Ipecac.

For prolapse at the climaxis, Lachesis, Aloë.

For prolapse from vaginal weakness, Aurum, Ferrum, Mercurius, Nux mosch., Nux vomica, Sepia, Stannum.

For prolapse from uterine growths, Argentum, Conium, Platina, Thuja.

For prolapse from atonic condition of the uterus, Aletris, Bromium, Cimicifuga, Helonias.

For prolapse with rectocele, Podophyllum, Ignatia, Aloë.

For prolapse with cystocele, Benzoic acid.

For prolapse with leucorrhœa, Alumina, Ammonium mur.

Hypertrophic elongation of the cervix, Æsculus hipp., Apis, Argentum, Cantharides, Conium, Trillium, Ustilago.

Special Indications in Prolapsus.—Aurum.—Prolapse from lifting or straining; worse during catamenia; with icy coldness of the hands and feet. Heat in the vagina; drawing pain in the pubes; severe back-ache; painful retention of urine; difficult stool. Quarrelsome, melancholy, suicidal.

Carbo animal.—Prolapse with induration. Great languor; so exhausted she can hardly speak. Delicate women with glandular affections. Alternate cheerfulness and despondency. Worse before and during menses.

Cantharides.—Elongation of the cervix. Burning in the vagina. Almost constant desire to urinate; passing only a few drops at a time.

Conium.—Prolapse with induration. Bearing-down pain, worse when standing or walking; before or during menses. Sterility. Painful induration of the breasts and other glands. Vertigo, worse when recumbent. Uterine complaint due to excessive sexual indulgence.

Opium.—Prolapse caused by fright. Fæces consist of hard, black balls. Softening of the uterus.

Secale.—The os appears at the vulva, and is hot and painful. Prolapse with ulceration; thin, fœtid discharge. Gangrene of the uterus.

Sulphur.—Prolapse with burning in the vagina, so that she is scarcely able to keep still. Walks bent over, from debility. Is worse at night, while at rest, and from standing. Sleep seems to exhaust her.

Chamomilla.—Pressure in the uterus like labor-pains, with frequent emission of limpid urine. Pains worse at night and in the open air. Altered disposition; though previously amiable, she can now hardly speak a pleasant word, and during the aggravation of pains she becomes furious and headstrong.

Kali carb.—The vagina and uterus are extremely sensitive, dry and burning. Aversion to an embrace, although her sexual desire is easily excited. Violent itching of the whole body during the menses.

Platina.—Prolapse with nymphomania. She thinks everybody inferior to herself. Menses too frequent, too profuse, dark and clotted.

Tarentula.—Prolapse when walking.

Asa fœtida.—Sensitiveness of the vagina, with strong sexual desire, offensive leucorrhœa, hysteria, and apprehensiveness.

Calcarea carb.—Often of the greatest value when the general symptoms indicate it.

China.—Prolapse following severe metrorrhagia or other protracted hæmorrhages.

Graphites.—Women of a scrofulous dyscrasia, with abnormal corpulence.

Kreasotum.—Elderly women with putrid leucorrhœa, swollen and sensitive uterus, and shrunken mammæ. Overgrown young girls who are irritable and sad, constipated, sleepless, and always chilly. The menstrual discharge offensive and dark. This remedy is deserving of careful study in the treatment of prolapse of the uterus and vagina.

Lachesis.—Prolapse at the menopause. The patient feels constantly as if she must lift her dress (or the bed-clothing) from her abdomen. The slightest pressure causes unbearable pain.

Mercurius.—A most valuable and efficient remedy when indicated. Prolapsus of the uterus and vagina, with intense itching and smarting. Feels as if a uterine support were needed on account of a sensation as if something is pulling downward. Cold sweat on the thighs every night.

Natrum mur.—She feels that she must sit down to prevent the uterus from protruding. This pressure seems to start from both sides of the abdomen. Dreads exercise on account of a sense of physical weakness. Burning in the urethra after micturition.

Veratrum album.—Prolapse, with vomiting, purging, and cold sweat.

Anteversion.

Anteversion consists of a straightening of the uterine curve, by which the cervix points more directly backward and the forward tilt of the fundus is exaggerated. The uterus is usually somewhat enlarged, and its texture denser and firmer than normal, with an increased amount of connective tissue. It may be fixed or movable. If the latter, unless the hypertrophy is considerable, the symptoms will be but slight. The fixation results from inflammation, and may be posterior, the cervix being permanently attached high up, or anterior, when the tube and ovary on either side is cemented by peritoneal adhesions. In either variety of fixation the uterus presses against the bladder as it distends, and it may even impinge on a flaccid and empty bladder. When the uterus is anteverted there has been a predisposing cause, such as subinvolution, cervical laceration, or chronic metritis, although this cause may now have subsided. Intra-mural growths may produce anteversion, but in this case, also, inflammatory attachments will exist between the posterior wall of the uterus and the rectum or intestine.

Symptoms.—The symptoms present are generally the outcome of the metritis, rather than of the displacement. When there is no inflammation the patient may not be conscious of anything being wrong, except at the monthly period. In anteversion the menstrual flow is apt to accumulate in the uterine cavity, thus causing dysmenorrhœa. Sometimes the hæmorrhage is long-continued, but moderate in amount. The heavily weighted uterus prevents expansion of the bladder, and consequently causes frequent urging to urinate. In fact, the bladder-symptoms are usually the most pronounced of all, though the pressure of the cervix on the rectum produces pain on defecation. Sometimes there is loss of ability to walk; almost always there is vaginal catarrh; and generally, in cases of long standing, there are reflex disturbances of the digestive and nervous system. Sterility is the rule. It is improbable that mere anteversion, disconnected from other abnormal conditions, causes any serious distress. "The ordinary statement that the uterus, when anteverted, presses on the bladder, is open to the fatal criticism that the uterus always presses on the bladder; while, so far as mere weight is concerned, there are, in the majority of cases, no special symptoms referable to the anteversion of early pregnancy." As the uterus is *always* anteverted in the early months of a normal pregnancy, the enthusiastic believers in anteversion pessaries are bound in self-justification to insert them in all cases.

Diagnosis.—In pronounced cases, the diagnosis is made without difficulty. The examination should be made after the bladder is emptied. The cervix will be found looking directly back. The fundus will be felt through the collapsed wall of the bladder, and is large and firm. The sound should not be introduced, unless it is impossible to feel the fundus in front. A finger in the rectum, in such cases, determines that the uterus is not retroverted. When inflammatory bands have been formed, their extent and attachments should, if possible, be defined.

Treatment.—The treatment of anteversion should be directed to the concomitant symptoms. When the endometritis, metritis, cellulitis, or peritonitis are cured, the patient will be well. The treatment, then, is to be general, not special or local; as soon as the general health is restored, the local disorder will disappear.

A great deal may be done for many of these cases by a careful supervision of diet. They generally need more nutritive food than they have been in the habit of taking. The stomach sympathizes with the deranged sexual organs, and sufficient food is not ingested; or, if taken in sufficient quantity, it is poorly prepared and innutritious. Almost invariably in these cases errors of diet and in habits of eating will be discovered if carefully inquired for, and these must be promptly remedied.

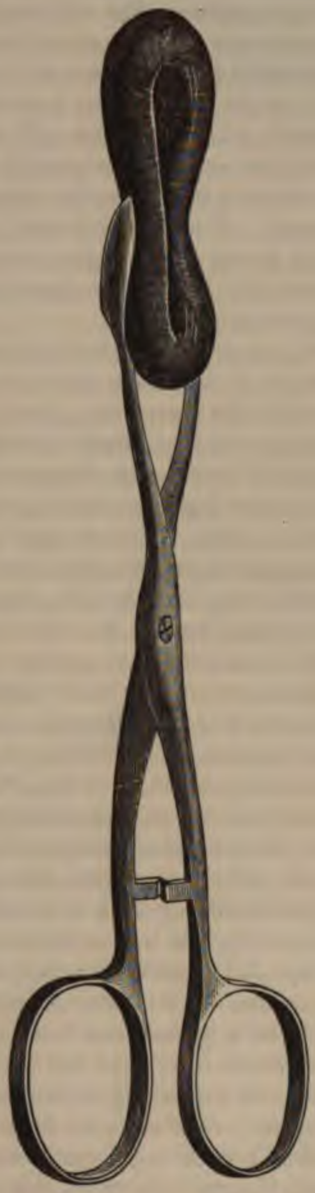
The horizontal position should be maintained as much as possible. Sitting on an ordinary chair, as at table, is especially bad—worse even than walking. A moderate walk in the open air, say ten or fifteen minutes, twice a day, is usually beneficial, but it should not be persisted in when walking gives pain. Efforts to push the uterus back into its place, either by the finger, the sound, or pessaries, are usually of little permanent value. Moderate retention of urine may be practiced, as tending to rectify to some extent, temporarily, the malposition. If the circumstances of the patient require her to spend most of the day upon her feet, or sitting at a sewing-machine, or engaged in some other unfavorable occupation, relief from pain may be obtained by the use of a ring pessary. Its use will delay a radical cure, and may permanently defeat the object of treatment; but the physician sometimes has no choice in the matter, and in working-women, when dyskinesia is severe, and the necessity of daily labor unavoidable, a mechanical support may furnish a more or less perfect temporary relief. A simple round rubber ring will answer the purpose. The ring should be so placed that its surface lies parallel to the posterior vaginal wall. It is introduced by seizing it, as in Fig. 7, with a pair of dressing-forceps, lubricating with vaseline or other emollient, and then passing it up the vagina as far as it will go. As the forceps-blades separate, the ring expands and draws the cervix within its lumen by atmospheric pressure. In this way the uterus is upheld in right angle to the vagina, its proper poise. While this simple contrivance often marvelously subdues pain, it does not cure the case, and must be considered merely in the light of an expedient. On the other hand, I have seen Belladonna, when indicated, remove permanently in a few hours an excruciating pain which had lasted for a number of weeks.

Of the remedies used, the following are of especial importance: Aconite, Arnica, Belladonna, Borax, Caulophyllum, Hepar, Helonias, Lilium, Mercurius, Murex, Nux vomica, Nux moschata, Phosphorus, Pulsatilla, Sabina, Secale, Sepia, Staphisagria, and Sulphur. See leading characteristics at the end of this section.

Retroversion.

The backward displacement is one of the most troublesome and painful of the uterine disorders, the severity of the pain being usually in proportion to the amount of backward tilt. In the more aggravated forms, the patient suffers the most extreme agony, and is reduced to a state of complete helplessness and chronic invalidism. The cause of this displacement is most frequently some form of traumatism, although there is no particular accident or form of exertion which especially tends to produce it. Under traumatic influence the uterus will be thrown forward or backward, according to the position it already occupies. Very trifling causes may make a great difference in the amount of injury sustained. The fulness or emptiness of the bladder, the condition of the rectum, or the position of the body at the time, may determine whether the uterus is thrown backward or forward. For instance, a lady takes a long carriage drive or goes on a railway journey; she neglects to empty her bladder which becomes abnormally distended. The bladder pushes the uterus upward and backward and the jarring of the carriage sends the uterus over still further. Of course, if the parts were in an absolute state of health this would not occur; but it must be remembered that displacements never occur with a healthy uterus. The uterus, having been bent backward, has little power of self-replacement. In cases of anteversion the filling of the bladder tends to restore the organ to its normal place; but the rectum does not fulfil the same service for a retroverted uterus. If, therefore, this form of version occur, it is likely to

FIG. 7.



prove permanent and more serious in its effects than an undue inclination forward.

Retroversion also takes place frequently as a part of the mechanism of uterine prolapse, the organ tilting more and more backward as it descends. A still further cause is the non-return of the uterus to its normal position after childbirth or after an abortion. The heavy and thick uterus lies for several days after confinement retroposed and very liable to be depressed; for if there be any pressure from above, as from the obstetric bandage, the cervix will be forced downward and forward, and the fundus will move backward. The peritoneal ligaments are not yet firm enough to support it, and consequently during the effort at defecation the uterus sinks lower and the cervix is pushed forward. Finally, peritoneal inflammation may produce cicatricial bands across the Douglas pouch or obliterate that cavity altogether and so bind the uterus permanently backward. This, although rare, does sometimes occur.

For purposes of definition, retroversion is divided into three stages or degrees; but these vary only in the amount of backward rotation to which the uterus has passed. If the uterus is only slightly turned backward and is nearly in the same axis as that of the trunk, it is called the first degree of retroversion; if still further rotated, it is called the second degree; and if the fundus has fallen below the promontory of the sacrum, it is then said to be in the third degree. The amount of congestion present, especially in cases of the second and third degree, is often very considerable, though in old cases the acute stage may have passed leaving the uterus in a condition of chronic irritability and liable to attacks of congestion on the slightest provocation.

Retroversion may occur suddenly, instantly, from some severe accident, but it is more likely to come on as a gradual process, now better, now worse, until at last it is very severe indeed. The patient is then necessarily confined to bed for a period of days or weeks, during which time the recumbent position will induce a favorable change, and without other treatment a certain degree of improvement will occur. The patient gets out again, but with impaired efficiency, to relapse suddenly in a few weeks. This is followed by another rest, and so on. At last, a certain tolerance of the condition of things is set up, and a partial recovery of the ability to attend to the duties of life ensues, but the general health is feeble, and the woman is constantly liable to a permanent break-down. Such is usually the history of cases which have been left to themselves without any attempt at treatment. If pregnancy occur, abortion is very probable; but, if the pregnancy continues, the trouble is relieved for the time being by the gradual physiological rectification which takes place. After delivery, either the retroversion returns and is worse than before, or, very rarely, a spontaneous cure occurs.

A fibroid tumor in the posterior uterine wall is a serious complication. Even very small tumors will give a great deal of trouble. The descent of an ovary into the Douglas pouch is another troublesome complication, and irremediable, should the ovary become adherent. If adhesion has not taken place, restoration of the uterus to its normal position will be followed by a return of the ovary also into its own place. When the fundus settles back firmly against the rectum, the interference with defecation causes severe straining, and this induces rectal prolapse.

Symptoms.—One of the most distressing symptoms in complete retroversion is the inability to empty the bladder, owing to the dragging back and tension upon the bladder, preventing it from completely contracting. There will be frequent ineffectual urging, and should the cervix press upon the meatus, or should that tube be flexed, as it is in some cases, there may be complete retention. The rectum, being pressed upon by the crown of the fundus, becomes irritable, and there are frequent calls to stool, with great difficulty in evacuating the bowels. Indeed, defecation becomes positive torture in extreme cases, and hæmorrhoids and ulceration sometimes occur. This interference with the functions of the bladder and bowels renders these cases not only painfully distressing, but at times dangerous to life. Pain on movement is always a well-marked symptom. Standing, walking, stooping, or even sitting may cause the most intense and agonizing suffering. The pain may not be felt in the uterus, but in the groin, in the sacral region, or in the vicinity of the umbilicus, in fact so far away from the real seat of the disorder as to lead to an erroneous diagnosis. Graily Hewitt says he has known of a case which was believed to indicate cancer of the pylorus.

Dyspareunia is generally severe in well-marked cases of retroversion. This sensitiveness of the uterus to touch is extreme, and any attempt to examine the uterus, unless done with the utmost care, will cause the patient to give vent to piercing shrieks, even in cases where under ordinary conditions the suffering is not very considerable.

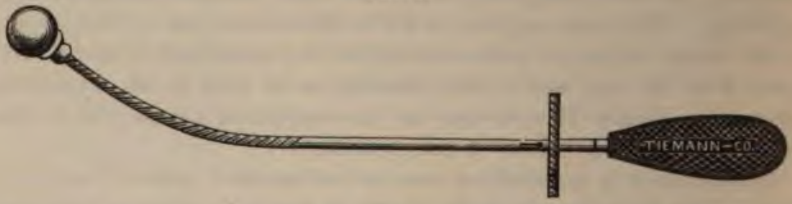
In acute cases occurring from a sudden fall or blow, these symptoms are all present in great severity. She " falls to the ground and is unable to rise, and is often in such agony that the face is bathed with perspiration and the pulse becomes weak and fluttering. Nausea and vomiting, even stercoraceous vomiting, may set in, and unless the patient is promptly relieved, she may sink under the accumulation of her sufferings."

In recent cases, especially in those occurring after childbirth, hæmorrhage is a frequent factor. This hæmorrhage often is quite scanty, and simulates menstruation, for which it is generally mistaken. Indeed, whenever after parturition the woman on getting up complains of dragging sensation and, the lochia having subsided, a flow of blood sets in, retroversion should be suspected and efficient treatment instituted. This loss of blood usually ceases when the woman lies down, but returns whenever she leaves the recumbent position.

Diagnosis.—The subjective symptoms point to the condition, but do not absolutely define it. The rectal touch, the patient being placed in the lateral position with the knees well drawn up, will show the fundus as a globular body pressing against the anterior rectal wall. The lower down the uterus, the easier becomes the diagnosis, but in a slight degree of retroversion the fundus will not be felt at all. This rounded tumor felt against the rectal wall might, however, be a fibroid tumor growing on the posterior wall of the uterus or a small ovarian tumor, or a hæmatocele, or carcinomatous infiltration between the rectum and uterus; but the condition and direction of the cervix will usually decide; if not, the sound may be used. The cervix will be found tilted upward, and sometimes very close to the pubic bones, the posterior vaginal pouch is obliterated, and an abnormal fold will possibly be felt in front of the cervix.

Treatment.—This consists in reposition of the uterus when not bound down by adhesions, and in the administration of suitable remedies for the congestion. The method of reposition which I have always followed is by means of the uterine elevator introduced by Professor Guernsey, of Philadelphia. This useful little instrument consists of a curved steel rod about eight inches long, with a handle at one end and a three-quarter inch ivory ball at the other, Fig. 8. The urine and fæces having been evacuated, the woman is placed in the knee-elbow position. The accompanying figures illustrate the principle. Fig. 9 shows the retroverted uterus. It is evident that the weight of the organ will tend to throw the fundus forward. Fig. 10 represents the uterus restored to its normal angle. As it is desirable that the woman should keep a recumbent position for a day or two, at least, after the operation, this is best performed on the bed, the patient being placed conveniently near its edge. The ball of the instrument, covered with a generous coating of vaseline, is passed gently within the sphincter ani, with the convex surface of the rod upward, and the handle is then elevated sufficiently to bring the surface of the

FIG. 8.



ball against the anterior rectal wall. Gradually the ball is pressed upward into the rectum, the handle being also correspondingly elevated. If care is not exercised, the ball may glide over the rounded tumor caused by the fundus, in which case the instrument must be withdrawn and reapplied. When skilfully used, the uterus is unerringly restored to its proper position, unless bound down by cicatricial adhesions. As the patient's person is not exposed during the operation, it is less objectionable than any other, as well as less painful. Although the uterus may be perfectly reposited, owing to its softness, or the lax condition of its natural supports, it may sink back into its old place unless great care is used. In some cases the reposition will have to be performed several times before the uterus will remain in its proper position; but usually, if the woman keeps her bed for a week, avoiding the recumbent-dorsal position, *and the proper remedy be given*, even in bad cases, no further trouble will be experienced. The patient must not lie upon her back, but on her side, and for a part of the time

FIG. 9.

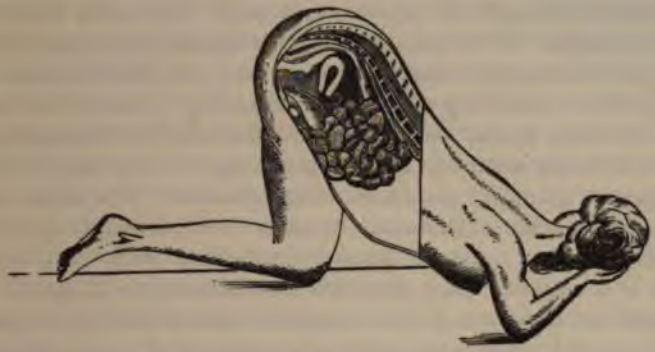
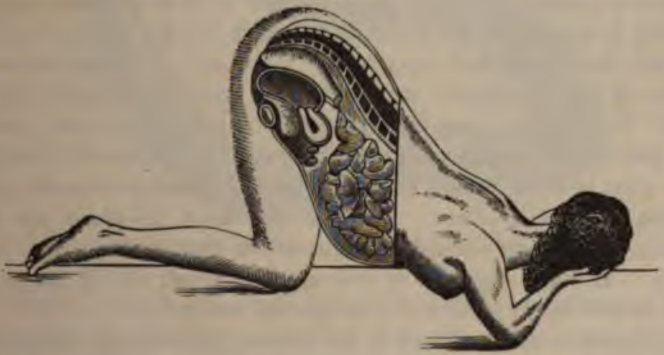


FIG. 10.



on her abdomen. The knee-elbow position should be assumed five or six times a day, for three to five minutes at a time. The upright position and exertion of every sort must be positively interdicted if a radical cure is expected.

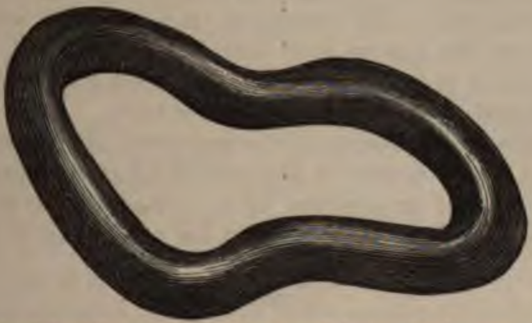
Having replaced the uterus and secured its retention in the normal position by postural treatment, we should collate *all* the symptoms of the case, and then apply the proper similimum. It is rarely desirable to resort to pessaries. If the proper remedy is selected, the most annoying symptoms will quickly subside, without any adventitious aids. My own experience, watching the results of various practitioners as well as my own cases, is that patients recruit faster without pessaries. If, however, it seems desirable in any given case to use one, the Albert Smith pessary generally gives the best satisfaction. The action of this, or any other similar, instrument requires to be carefully watched at first. The pessary must be carefully examined while *in situ*, to see whether it is actually doing the work for which it was designed. The uterus will not always bear to be carried at once to its proper position. In such a case a small pessary may be adjusted and worn for a week or two, to be followed later by a larger instrument. In this way a succession of sizes may be used until the uterus is carried quite up to its former place. In some cases, a pessary which seems to fit well will, after a few hours, cause extreme pain. It is dangerous to leave such an instrument in the vagina for even an hour; and it may be laid down as an *invariable* rule that if the patient is conscious of its presence, except in the relief it gives, it must be instantly removed. It requires very great attention to detail in size and shape, to fit a pessary so that it is a benefit and not an injury. It may be well to mention that a pessary is worse than useless if it be inserted with the concavity downward. To insert the pessary, let the patient lie on the side, with the knees well drawn up. Lubricate the instrument with vaseline, or other suitable emollient, and pass it obliquely into the vagina. The finger must be inserted as a guide, so as to push the upper part of the instrument behind the cervix; otherwise it is almost sure to pass in front of the cervix, in which position it would greatly aggravate the malposition. After it has been in place for a few moments, the patient should be requested to cough, in order to test its stability. If well adjusted, it will remain firm; but if improperly placed, it will likely glide out through the vulva.

The pessary must so fit as to be held in place by the clasp of the vagina which completely envelops it. If the pessary makes any pressure against the pubic bones it is badly shaped or improperly adjusted, and will cause mischief. Many practitioners fail with retroversion pessaries because they attempt to make the instrument push the uterus back into place. On the contrary, a pessary should never be applied in retroversion until the uterus has been completely and effectually reposited in its natural anteverted position. This may require keeping the woman in bed for two or three weeks, and frequent replacement of the uterus every day or two, but it must be done, if the best success is to be attained.

The best material of which pessaries can be made is hard rubber. These, when greased and passed rapidly to, and fro, in a flame, soften sufficiently to be moulded to any required shape. Wire instruments covered with soft rubber are very objectionable on account of the disgusting odor which they occasion, and are injurious to the vaginal mucous membrane. The pessary should be as light in weight as possible, and should permit the vulva to close completely, for if the vaginal mucous membrane is exposed to the air, it drys and hardens. The patient must be examined repeatedly to see if the instrument is answering its purpose. It does not at all follow that a pessary which acts beneficially for a time, will do so indefinitely. Indeed, in many instances, after a time, the uterus is actually pushed over into anteversion, and the abnormal symptoms which had been occasioned by the tilting of the uterus backward, recur. It is desirable, therefore, to do away with the use of the pessary as soon as possible, and ordinarily I advise getting along without it altogether.

Other forms of pessaries are used, but none are equal to the Albert Smith, Fig. 11. The ordinary ring pessary, owing to its elasticity, is easily borne, but to be of any real use must be of large diameter, and so unduly stretches the vagina transversely. Stem pessaries of all sorts are an abomination, and should be discarded. There are a multitude of instruments differing in shape, material, and mode of application, advertised, but for all their vaunted excellencies they seldom realize expectation.

FIG. 11.



The Albert Smith variety of the well-known Hodge pessary.

Professor Simpson's operation for the elevation of the retroverted uterus by means of the uterine sound has been widely canvassed. I speak of it here merely to condemn it, at least in the hands of the ordinary practitioner. Even in the hands of skilled gynæcologists it is an instrument of torture, frequently causing severe hæmorrhage, and perforation of the fundus is not unknown. Various surgical operations are performed for the cure of retroversion, including incision of the cervix, gastrotomy and fixation of the uterus anteriorly, and oöphorectomy; but my own observation is that even the worst cases are curable by medicine, patience, and time, and that, consequently, operation is unjustifiable because unnecessary.

The hæmorrhage which sometimes occurs in cases of retroversion (particularly after childbirth) may be arrested by injections of hot water. The temperature should be 104°–110° F. But nearly always the flow stops immediately upon rectification of the false position.

The principal reliance in all cases must then be upon the selection and administration of the proper remedy homœopathic to the case. The most important of these are Æsculus hipp., Belladonna, Calcarea carb., Cimicifuga, Ferrum iod., Helonias, Kali carb., Lilium, Lycopodium, Murex, Nux vomica, Platina, Sepia, and Sulphur. The especial indications for these, and other, remedies will be found at the close of this section.

Lateroversion.

This form of uterine displacement is not very common, except as it occurs in connection with the conditions already described. At times the uterus, instead of being rotated directly backward, will turn toward one or the other side. The symptoms are not usually very severe, as the pressure on the rectum and bladder is less noticed. The use of the uterine probe in connection with the vaginal and rectal touch will detect the direction in which the fundus is lying.

Treatment.—The patient may be instructed to lie as much as possible on the side opposite to that toward which the fundus points. The treatment must be governed by the symptoms, for which indications may be found in the therapeutic list at the end of this section.

Inversion.

The term Inversion of the uterus means literally that the organ is turned inside out. This may be partial or complete, and if the former, may vary greatly in degree. It occurs most frequently at childbirth, or as the direct result of mismanagement at that period, about nine out of every ten cases having such origin. The immediate cause is too sudden delivery, occurring at the water-closet or when the woman is on her feet, or undue traction upon the cord while the placenta is still attached to the uterine wall. Distension of the uterus by blood-clots also favors inversion if at the same time its walls are flaccid and weak. Inversions secondary to uterine tumors are of rather unfrequent occurrence. The tumor, partly by its weight, and partly by the degeneration and consequent weakness of that portion of the wall to which it is attached, sinks gradually downward, dragging the uterus with it. Both benign and malignant tumors may lead to inversion; generally the cause is a fibroid polypus, or a sarcoma. Carcinoma has never been known to cause this degeneration. Polypi generally occasion an incomplete form of displacement unless the base of attachment is broad.

Although in some cases inversion may be said to take place from below upward, similarly to the process of vaginal prolapse, yet in a great majority of cases the mechanism of inversion is as follows: A portion of the uterine wall, having lost its tone, sinks inward. This loss of tone may consist in fatty degeneration or malignant infiltration of the descending part, or after parturition may be occasioned by paralysis of the placental seat (Rokitansky). The depressed portion acts like a foreign body, and so induces muscular contractions of the non-depressed part of the uterus. In this way it is gradually pushed down until it reaches the os internum, and so on into the vagina. Matthews Duncan also describes a passive condition in which the entire uterus is driven down by intra-abdominal pressure simply (Hart). In a majority of cases the cervical canal is still present, forming a constricted band about the upper portion of the inverted mass. The inversion extends only to the os internum, the uterus lying, therefore, partly in the vagina, and partly within its own cervix. If in recent cases the os is flabby, hæmorrhage is probable, may be constant or nearly so, rarely very profuse. Involution slowly takes place, the uterus becomes firm and dense, and the cervical canal narrows; if strongly constricted, gangrene is imminent; in other cases it remains large, soft, compressible, and œdematous. When small, firm, and spherical, it might be mistaken for a fibroid tumor; but it is of a deeper red color, and bleeds easily when fingered. The bladder is not affected, unless with the inversion there is also prolapsus; but here the prolapse, not the inversion, causes the cystocle. With prolapsus the cervical ring is less marked and may disappear altogether.

When fully inverted, the uterus forms a cup-shaped body lying in the vagina with its base at the vulva, covered by its mucous membrane which is now external, surrounded at its upper edge by the cervix, and lined by the peritoneum. Into this cup-shaped hollow descend, in recent parturient cases, the ovaries, Fallopian tubes, and a coil of intestine; but as involution proceeds these are driven upward, and the cavity is reduced to small dimensions. Peritoneal adhesions are not known to occur except in those rare cases in which metritis sets in after inversion; and inflammation is almost sure to be followed by septicæmia and a fatal termination of the case.

Symptoms.—The patient usually suffers from a feeling of great discomfort in the pelvis and a sense of dragging; but cases have been observed which had lasted for many years without occasioning a symptom. On account of the absence of subjective symptoms the uterus has been mistaken for a tumor and removed (Fritsch). In acute cases there is retention of urine, hæmorrhage, often very excruciating pain, and sometimes syncope. If the uterus is not replaced at the time, and if the patient does not die from septicæmia or other complication, the case passes into a chronic state. The uterus is incapable of self-replacement. The most dangerous symptom in the chronic stage is the hæmorrhage. Not only is menstruation very profuse, but bleeding occurs during the inter-menstrual period on the slightest provocation. This leads to anæmia and to general prostration. The lower extremities become œdematous, the power of locomotion is lost, and the breathing becomes labored or, perhaps, asthmatic. Only occasionally are the collateral symptoms so slight as to permit the patient to attend to her household duties. The pain in inversion is very similar to that from prolapsus, but varies indefinitely in intensity. The patient may be bedridden for years. Cases have come under observation which had persisted for a quarter of a century, or more.

Diagnosis.—In order to make a diagnosis of inversion we must first determine that the uterus is not where it should be, and then demonstrate that the tumor in the vagina is the uterus. Before the anatomical changes were thoroughly understood even the most eminent surgeons were unable to diagnose inversion with certainty. Even now the utmost care is sometimes needed to prevent falling into error. The examination should be made in this manner: An anæsthetic will usually be required; the A. C. E. is best. Examine by rectum and vagina, by rectum and bladder, and by vagina and bladder. Pass a finger into the rectum until it feels the tumor in the vagina; pass a noose up the vagina, around this tumor, and make traction. The finger in the rectum will pass over the tumor as it descends, and detect an opening in its superior surface. Then pass a sound into the bladder and direct the point downward until it can be felt by the finger within the rectum. This proves the uterus absent. Pass the finger into the vagina and sweep it around on all sides, to determine that it is only attached at its upper extremity, and that the mucous surface is continuous all around. The sound in the bladder passes above the tumor, and its point can be felt by the finger in the vagina. The uterus, therefore, is inverted. In addition there may be fibroid or other growths in the uterus or vagina, and the lower part of the projecting tumor may be such a growth, but the absence of the uterus from its proper place, as shown by the recto-bladder examination, proves the diagnosis.

Partial inversion of the uterus is much more difficult to diagnosticate than complete inversion. It is most apt to be confounded with a polypus, but may be distinguished from it by the fact that the sound cannot be passed as far within the os uteri as customary; whereas, in cases of polypus the cavity is usually even deeper than normal. When a polypus is present the uterus is generally enlarged, owing to the presence of the growth, and the position of this hypertrophied organ can be clearly defined. The most complicated cases are those in which partial inversion is associated with polypoid growths; but even here an examination, as described above, will establish the diagnosis.

Treatment.—The replacement of the inverted uterus, when this accident occurs in the progress of labor, is attended with little difficulty, and need not detain our attention here. But when this condition has become chronic, it requires no little ingenuity to properly reduce it. Formerly the only treatment for these cases was excision, a treatment involving the immediate death of one out of three cases operated upon, ignoring secondary conditions by no means favorable to the subsequent comfort of the survivors. The credit of better methods is due to M. Valentin, who, in 1847, was the first to reduce a chronic inversion by manipulation.* The reduction was performed by placing the left hand over the hypogastric region, the right in the vagina grasping the uterus between the thumb and finger. After only ten minutes' manipulation the reduction was accomplished, although the uterus had been inverted for a whole year. Various other surgeons reported successful taxis, and in 1856 Tyler Smith reduced, in four days, an inversion which had existed for twelve years. The uterus was manipulated for about ten minutes, night and morning. During the interval between each operation, a large rubber ball pessary was placed in the vagina and inflated to as great an extent as the patient could bear. During one night the patient suffered a great deal of pain, due to uterine spasm, and in the morning it was found that the uterus had returned to its normal position. The recumbent position was maintained, and a small air-pessary worn for a few days; the patient subsequently became pregnant, and her health fully restored.

The treatment of inversion may be by the hand alone; by the hand assisted by instruments; or by either of these methods, aided, in the interim, by continuous, moderate, elastic pressure. Amputation is justifiable only when the uterus is gangrenous, cancerous, or extensively ulcerated. Long duration of inversion is no argument against the possibility of reposition. The operation is best performed about one week after menstruation. The patient is ordered to keep her bed for a few days, and the usual instructions as to liberal diet, cleanliness, and attention to the calls of nature, are to be given. The tumor is to be bathed by injections of hot water (104° F.) several times a day to tone the mucous surface and to moderate congestion. Having thus prepared the patient, and administered an anæsthetic, we have the choice of the rapid or slow method. The latter has been described already. The former consists of having a relay of assistants to keep up the moulding and pressure on the tumor, relieving each other at intervals of five minutes. In this way even very bad cases can be cured in a few hours; but unless there seem to be imperative reasons for haste, I greatly prefer the slower method. In moderate cases reposition may be effected by introducing into the vagina the largest Molesworth dilator which can be borne. This alone is sometimes all that is needed, the cure being accomplished in from two to twelve days. It might be well to try this method first in all cases. If this does not succeed, place the patient in the lithotomy position, and grasp the tumor with the fingers of the right hand as far into the cervix as possible. The part which has been inverted last is to be pushed up first, as in all herniæ. Keep up a combination of steady pressure and moulding with the fingers and thumb, while counter-pressure is applied externally with the left hand. Sudden, forcible, and abrupt movements must be avoided; the parts must be coaxed back rather than driven. Repeated trials may be necessary before the firmly contracted cervix uteri will begin to yield and permit the tumor to rise within it; but patience and persistence conquer here as elsewhere, and unless prevented by firm adhesion (very rare), restoration may be accomplished no matter how much time may have elapsed since inversion has occurred. A case of twenty-two years' duration was reduced in less than two hours.

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* Ranking, vol. vii.

When the hand is fatigued, the pressure on the tumor may be maintained by means of a water-bag or other dilator. As the hand cannot keep up such a steady pressure for any length of time, various mechanical substitutes have been invented. Thus Dr. Barnes used an elastic cup set on a curved iron rod with a spiral spring at the distal extremity. The spring is pressed against the operator's chest, and the cup is steadied by the hand in the vagina. Mr. Lawson Tait employs a stem six inches long, with a cup-shaped end, pressure being maintained by elastic bands fixed to the lower end of the stem and to a bandage around the patient's waist. Drs. Atthill, Gervis, Aveling, and others, have proposed modifications of these instruments, but it is evident that all such mechanisms are more apt to bruise the parts than would the operator's hand, and if they slip, they might rupture the fornix or, by unequal pressure, produce sloughing.

In cases of inversion due to uterine growths, these should be first enucleated; then wait for a few weeks and see if the uterus will not replace itself. If it does not, proceed as above. If the growth has a large basis of attachment, the fundus may be so pulled upon as to present the appearance of a pedicle. Thus, without great caution the polypus may be excised and with it a large portion of the fundus uteri. This accident has happened (Marion Sims).

Dr. Emmet very ingeniously employs the hand on the abdomen not in making simple counter-pressure, but in sliding the abdominal parietes downward over the tumor, and thus assisting to roll out the inverted organ. When the fundus has been partially re-inverted he retains it by closing the external os with sutures. This accomplishes two purposes; it prevents the fundus from again descending, and by the traction produced completes the re-inversion.

After the operation the patient should maintain the recumbent position for two or three weeks, receiving meanwhile such medicinal treatment as may seem requisite. Hypericum, Chelidonium, or Arnica may be useful for the immediate results of the operation. Beyond this the selection of the remedy will depend upon the sensational and functional symptoms which are exhibited by the patient.

Distortions of the Uterus.

When the uterus is bent upon itself, it is said to be flexed. There are normal flexions just as there are physiological displacements. A force may act upon the uterus causing it to bend out of shape, but as soon as this force is removed, the natural elasticity of the organ restores it to its former shape and position. If the uterus be unhealthy, this alteration in shape is maintained, the abnormal position becomes chronic, and it is this condition which is denoted as *distortion* of the uterus.

Distortions differ from malformations in that the latter are congenital, while the former are the result of disease; but in practice it is sometimes rather difficult to distinguish a malformation from a distortion.

The causes of uterine distortions are predisposing and exciting. A uterus is in a condition favorable to distortion when its tissues are unnaturally soft. This undue softness of the uterus may arise from malnutrition or from sub-involution. Local chronic starvation (malnutrition) may be found in both single and married women. Previous pregnancy predisposes to distortion when the uterus, or its attachments, fail to properly involute, or when the organ is left soft or congested. Repeated pregnancies at short intervals in women who are badly nourished or over-worked is very likely to induce distortion. The uterus has not time to recover its tone from one pregnancy to another, and acted upon by some outer force, it becomes flexed. General prostration, as after fever or other exhausting illness, is a very powerful predisposing cause, unless great care is taken to prevent over-exertion.

The exciting causes of distortion of the uterus are accidents, falls, strains, excessive exercise, use of the sewing-machine, nursing invalids, and occupations requiring much standing. Women are apt to forget that they cannot do safely during menstruation what they might do at other times; and from this lack of caution arise many cases of flexion.

Fig. 12.

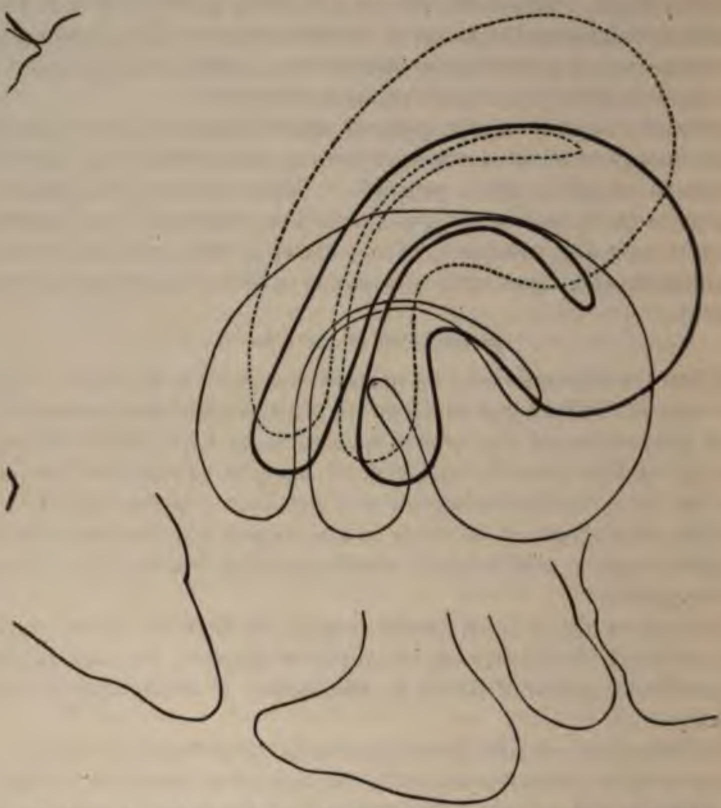


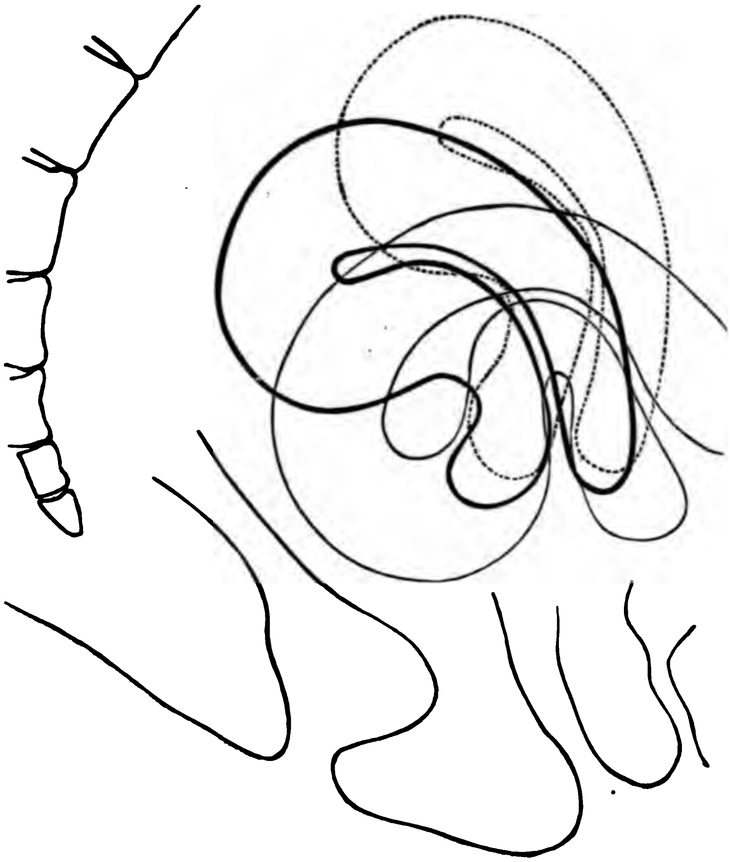
Fig. 12 shows three degress of anteflexion with the accompaning rotation, and the relation of the fundus to the bladder and urethra, and of the cervix to the vagina and rectum. Fig. 13 displays the same relationships when the uterus has a backward flexion, except that now the fundus crowds upon the rectum and the cervix upon the urethra and bladder. (After Hewitt.)

The angle of distortion is most commonly situated at the internal os uteri. In general, the upper half of the cervix and the lower half of the fundus are involved in the bend. The flexion may be forward, backward, or to either side, and may be associated with prolapsus or any form of version; rarely is the uterus distorted without also being dislocated as a whole.

There are various pathological conditions consecutive to flexion. In the first place, there is a swelling of the tissues on the concave side of the bend. This ridge or elevation is frequently so prominent as to be felt by the finger through the vagina. Gradually, as the flexion becomes chronic, this swelling disappears and is replaced by atrophy. This result apparently is caused by the compression of the organ at this point, though in old cases the whole uterus is often shrunken and hardened.

Another immediate result of flexion is partial closure of the cervical canal. This affects menstruation and prevents conception; dysmenorrhœa and sterility follow. This subject is more fully discussed in the article on Menstrual Derangements. Congestion is another local result of flexion. The circulation in the upper portion of the uterus is necessarily interfered with to a very considerable extent when the bend is acute, and the inevitable result is that the fundus becomes swollen and heavy. Secondarily the congested fundus becomes sensitive, in some cases to an extraordinary degree. This congestion gen-

FIG. 13.



erally causes very profuse menstruation; but, again, the amount may be diminished and the menses almost cease. In chronic flexion the os uteri is apt to be patulous and the cervix everted. The eversion is most prominent on the side to which the fundus turns. If the flexion is forward, the anterior wall of the canal will be most affected, and if backward, the posterior wall.

One of the most common as well as important effects of distortion is descent of the uterus as a whole. A distorted uterus is a source of irritation, and interferes either with micturition or defecation, perhaps with both. The general result is that the patient strains at stool or in urinating, and this process, going on for months, gradually forces the uterus down lower and lower. The process may be very slow, and in many instances undoubtedly is so, but the constant tendency of this action and reaction is to bring on prolapsus.

Symptoms.—Pain on walking is one of the most common symptoms of uterine flexion. This pain may be slight or it may be very violent; it may be felt only in the small of the back or it may seem to involve the pelvic viscera, but its prime characteristic is that it is brought on by motion. There is, therefore, a strong disinclination to move, even though there be no impairment of ability for motion. While a moderate amount of flexion may exist without pain on locomotion being a pronounced symptom, it is my belief that it is never absent in cases of distortion during the congestive period. Not only is pain brought on by walking, but lifting the arms, carrying a weight, stooping or riding in a carriage, all produce pain in a more or less severe degree. This seems to be partly caused by the jarring of the sensitive uterus, and partly by the fact that motion temporarily increases the distortion. In one kind of flexion certain movements always cause pain; in another form of flexion these movements cause no pain whatever, but another class of movements are painful. In this way the effects of certain exertions may enable us to diagnosticate not only the presence of a flexion, but the actual direction of the bend and its probable acuteness. These observations are particularly useful in treating young girls, because it enables us to secure, in many cases, a reliable diagnosis without compelling the patient to submit to a physical examination; and I consider it always desirable to get along, if possible, without a digital examination in treating virgin women.

The pain experienced is apparently due to pressure upon the uterine nerves at the point of flexion, to temporary increase of congestion during locomotion, and to tension upon the uterine ligaments and attachments. The bearing-down feeling seems certainly due to the stretching of the round ligament, the broad ligaments, and the utero-ovarian ligament; but this sensation is associated with all forms of displacement, and is not characteristic of flexion. The congestion of the os has probably very little to do with creating the pain on movement which I am discussing, as frequently in prolapsus there is a very turgid cervix, and yet the patient hardly experiences real pain. Congestion of the body of the uterus adds to its weight, and so tends to increase the flexion; and this in turn compresses still further the tissues, and with these the sensory filaments at the angle of distortion. It is, therefore, quite within the bounds of probability to say that the pain peculiar to distortion is located at the seat of the flexion.

In a state of health the uterus is rather insensible to touch; but in distortion we find it very sensitive, even the lightest touch giving exquisite pain. The severity of this hyperæsthesia seems to be in proportion to the alteration in the shape of the uterus. As in retroflexion the uterus can, for anatomical reasons, bend much lower upon itself than is possible in anteflexion, so it is well known that the pain in severe cases of retroflexion is much more acute than it ever is when the uterus is bent forward.

Beside these two forms of pain, patients sometimes also suffer from spasmodic pains, always felt by the same person in the same spot, but having various seats in different individuals. These pains come on suddenly, often when the patient is completely at rest, and sometimes are distinctly intermitting. In general, if the uterus is retroflexed, the pain is felt in the back or in the thighs, while if it is bent forward, pain is experienced in the groins and in the abdomen.

The menstrual function is always disturbed when the uterus is distorted. The discharge is usually excessive and expelled in gushes, the patient suffering from severe recurrent pain. While dysmenorrhœa may be occasioned by various states other than flexion, in actual practice this is the most frequent cause both of the severe pain experienced and of the difficulty and delay with which the uterus gets rid of its contents. On the other hand, actual suppression or even premature menopause may result from distortion. The flow grows more and more scant at each recurring period, until at last it ceases altogether. It is probable that compression of the uterine bloodvessels cuts off the supply, and it is thus incapable of continuing its functions. Sterility is the rule in flexions. When pregnancy does occur, abortion is almost sure to follow. Uterine leucorrhœa is frequent, and when the flow comes in gushes it is rather diagnostic.

Treatment.—It is evident that the object of treatment in distortion is necessarily broader than in dislocation, owing to the graver pathological changes which have taken place. In the former case all that we have to do is to rectify the position and to overcome the tendency to displacement. But in flexion we have also to repair the effects of the bending. This thickening, or thinning, or hardening of the uterine wall, in some portion or in its entirety, is a very troublesome condition to treat, and requires both patience and skill. Local applications do no good in flexion except to palliate pain, and thus obscure the most important symptom in a therapeutic sense. I never use chloroform, opium, nor any other anodyne save warmth. Nor do I use local medicinal applications in the form of suppositories or lotions of any kind, except a weak infusion of hydrastis in cases where cleanliness cannot otherwise be secured. Usually, flannels wrung out of boiling water and applied over the pubes or to the back, hot salt in bags in the same manner, bottles of hot water, and hot water injections (104°–110° F.) are the only local measures I find necessary. Electricity may be employed with success both as a palliative and as curative of the distortion; and this not only in recent cases, but even in chronic cases where the uterus has become indurated and atrophied. Its mode of application will have to be adjusted to the effects to be produced.

Postural treatment is very desirable and should in all cases be instituted. The knee-elbow position should be maintained for some minutes several times a day. The patient should be taught how to admit air to the vagina while in this position by separating the labia with her fingers. The patient with a retroflexion should not be permitted to lie upon her back at all, but prone or on her side. On the other hand, when the flexion is forward, the supine position is very useful in aid of rectification, the effect being increased by placing a pillow beneath the sacrum. The unbending of the uterus by means of a sound is a rather dangerous operation in unskilful hands. It should never be employed in cases where the uterus is very soft, nor just before or after menstruation. The nearer straight the sound the better, as there is less torsion of the uterus; but it is more difficult to handle a straight sound than one well curved. The most probable danger from the use of a sound is abrasion of the mucous surface of the uterus and consequent inflammation, death having occurred from this cause. When the uterus has been nearly straightened by means of the sound—or, in cases of moderate flexion, from the first—a dilating sound can be used with advantage in order to increase the calibre of the cervical canal. This instrument is constructed on the principle of a glove-stretcher, and accomplishes the purpose thoroughly; it must be used with great caution, only a slight amount of force being exerted, and the instrument used only two or three times a week. Dilatation by tents has only a temporary effect and is not recommended.

Of very great importance is perseverance in careful feeding. Too minute attention cannot be given to maintaining nutritional activity; and I think I am quite justified in saying that, no matter how skilful the treatment otherwise, the secret of success lies in establishing the habit of taking a sufficiency of food, of proper quality, and at not too long intervals. The real malady in many cases is starvation; not merely local malnutrition, but systemic. The best of therapeutic measures are of no avail in such a case, but food conjoined with rest works wonders in a few weeks. The patient is usually oblivious of this condition, and may even perish from its effects in the midst of plenty. The permanency of the cure depends more on the general than on the local treatment. The uterus may be readjusted and reposed, but, as a rule, the flexion will return unless the general health is built up by food and rest, and the general dyscrasia overcome by the proper homœopathic treatment. The various forms of flexion are to be treated according to the principles laid down in the section on Versions. It is not easy to state precise rules of treatment appropriate in every case, but the generalizations offered above, and the more particular suggestions under each form of version, will enable the practitioner to act understandingly. Above all, with the greatest care study out the key-notes of the case, in order to be able to apply the true remedy.

Therapeutic Indications.—Æsculus hippocastanum.—The patient complains of a constant throbbing behind the symphysis pubis; or of an aching pain in the sacrum, running around over the crest of the ilium, aggravated by walking or stooping forward; or of a pain in the back, which renders her unable to walk but a little distance at a time, this pain being quickly relieved by rest, especially by recumbency; or of a pain extending from the abdomen to the small of the back, so laming in its nature as to make it almost an impossibility for her to get up and walk after sitting awhile. The leucorrhœa is thick and sticky, of a dark-yellow color, corrodes the labia, is increased by walking and after the menses, the discharge becoming very profuse after any unusual fatigue. The rectum feels uncomfortable and dry. In some cases there is a sense of fulness in the rectum, with desire to strain. The bowels move tardily, causing much pain, and the patient suffers from hæmorrhoids, which are blue and burning. Æsculus is one of our most valuable remedies in retroversion and retroflexion associated with painful, protruding piles, and throbbing in the pelvic cavity. The patient is apt to be extremely irritable and gloomy.

Kali carbonicum has many characteristics resembling Æsculus. It has heavy aching pain in the small of the back, increased by walking and relieved by rest. But this pain runs down the thighs, and not round the ilium. The feeling is as if there were a heavy weight inside pressing upon the back. The leucorrhœa is yellow and corrosive, causing a burning itching on the pudendum and an eruption upon the thighs. It is more acrid, as well as thinner, than the Æsculus leucorrhœa. The bowels are constipated from lack of power of the rectum to expel its contents (*Sil.*, *Caust.*), but hæmorrhoids are not so frequently present. If there are hæmorrhoids, they are of the bleeding sort. The constipation is apt to be more pronounced during menstruation, and while straining at stool she feels as if the pelvic contents would be borne down and forced out through the vagina and rectum. Micturition is frequent, and the urine is scanty and fiery-red. Urination under Æsculus is frequent and scanty, but the discharge is apt to be thick and yellow. The existing thoracic symptoms aid greatly in determining the remedy. Kali carb. is especially beneficial to anæmic women, who suffer from chilliness, who have a great tendency to start at the least touch or surprise, and who, as the result of their physical weakness, are timid and apprehensive. Her sleep is often a half-wakeful nightmare, and especially about two o'clock in the morning all her ailments are aggravated. If she inclines to abort about the second month, as a habit, this will direct attention to Kali carb.; Sabina, at the third, or Sepia, at the fifth. A diagnostic symptom, when present, is the bag-like œdema of the lower lid, less frequently of the upper one; this swelling is sometimes enormous, and is then always, in my experience, associated with other characteristic symptoms of Kali carbonicum (compare Apis).

Belladonna, like the two preceding remedies, has pain in the small of the back as if it would break; but this is more of a bearing-down sensation. It also has stabbing pain, and burning or throbbing in the lower part of the back. A characteristic of the pains is their sudden onset and indefinite continuance; they cease as suddenly and unexpectedly as they began. Another important factor is the hyperæsthesia, not only of the pelvic viscera, but of all the special senses. The ovarian and uterine region is so sensitive that she cannot bear the least jar. If any one happens to knock against the bed upon which she is resting, or upon the chair on which she is sitting, it aggravates her exceedingly. If she walks, every step sends intolerable shooting pains up through the internal organs to the back, or *vice versa*. When sitting, she has various sensations in the uterine region, stitching, clawing, clutching, darting, burning. Relief comes from standing or from sitting with the shoulders well thrown back, but lying supinely aggravates the pains. The mind is active and alert, but she has aversion to work and disinclination to motion. Mentally she is so restless that she cannot remain long in one place. Taste, sight, smell, and hearing are all keener than formerly, and she is apt to be quarrelsome and violent on account of the annoyances from sound and odors occasioned thereby. This over-sensitiveness interferes greatly with her sleeping. She is sleepy, wants to sleep, but cannot go to sleep. Just as she is dropping off to sleep a shock awakens her, or if she gets to sleep, she starts, and moans, and tosses about, and wakes up affrighted. The desire to sleep, with inability to do so, should always direct attention to Belladonna. The leucorrhœa is most profuse in the morning, and is attended by sudden colic, singularly enough relieved by standing upon her feet. The menstrual discharge is bright-red, and feels hot to the parts as it passes. While usually bright in color, when the uterus is badly flexed it is dark, has coagula floating in it, and is offensive. If the uterine position causes delay in the menses, or amenorrhœa, there will be congestion to the head, red, bloated face, crazy headache, and perhaps fantastic illusions, which impress her as being real, although all the time she knows that they are not.

Murex has pains in the small of the back and in the hips, coming on while lying down and going straight through the pelvis, similarly to those of Belladonna. But backache is not so characteristic of Murex as are the pains which spring from the uterus itself. The Murex patient complains of a violent pain which seems to start in the uterus and extends upward through the abdomen into the thorax, whence it crosses to the left breast, leaving a severe pain in the gland. The labia are swollen, the os uteri spongy and inflamed, there is a sense of weight in the vagina, and of lancinating or throbbing pain in the cervix and fundus. The patient is troubled with violent nymphomania, excited by the least contact of the clothes with the external genitals. The menses are too frequent and like a hæmorrhage in profuseness; but this flow seems to relieve her and she is in better spirits, and not peevish and irritable as she was before menstruation. The local pains, however, do not improve, and she has a sensation in the uterus as if it had been cut with a sharp instrument. There is leucorrhœa during the day, and during stool, of greenish water, or thick and sanguineous—the green variety may be corrosive. The desire to urinate is frequent; the urine smells like Valerian, and deposits a white sediment.

Cantharides.—Suitable for slender, sterile women who are excessively debilitated and emaciated, but who are nevertheless amorous almost to frenzy. They are pale and wretched-looking, have aversion to all kinds of food, have incessant calls to urinate, with pains in the loins and coccyx; but the most characteristic symptom is the presence of burning pains in various parts of the body—burning in the urethra after urinating, burning in the anus during stool, burning in the pudendum, burning in the vagina, burning, acrid leucorrhœa, burning in the abdomen, burning in the stomach and through the whole intestinal canal, burning in the sides of the head. The nymphomania of Murex is purely local and does not cause onanism, but the Cantharides patient may masturbate to a frightful extent, and become shameless and unchaste.

Sepia has symptoms in common with Cantharides, Murex, and Belladonna. This patient masturbates even when the vagina is so sensitive that normal coition is intolerable, but she has none of the shamelessness and boldness of Cantharides. On the other hand, sexual indulgence, either normal or abnormal, causes prostration of the mental faculties. The mental symptoms of Sepia are very pronounced and important. She is very much occupied with thoughts about her health, weeps over her real sickness and about imaginary illnesses, complains about the treatment she receives from others, and is so absorbed in her own feelings and wrongs as to be utterly indifferent to all else, even to her own family. As under Murex, she has a painful sensation of emptiness and goneness in the stomach, and of pain and weakness in the small of the back, but the uterine conditions are very different. The internal genitals feel dilated, dragged down, and as if congested. This causes oppression of breathing, associated in some cases with violent palpitation of the heart. There is a sense of weight or of a ball in the anus, not relieved by an evacuation. The stools are difficult, insufficient, and sometimes resemble sheep's-dung, but even a soft stool is voided with difficulty. The urine is frequent and painful from pressure on the bladder, and the urine greasy, turbid, and very offensive. The urine is so putrid it must be immediately removed from the room. The choice of remedy will often have to be made between Sepia and Belladonna. The wakefulness and restlessness at night, the bearing-down sensation in the pelvis as if everything would protrude, the bursting headache, the oversensitiveness to light, noise, and odors, the spasmodic muscular movements, the antagonistic and contradictory mental states, all point to both remedies. But there need never be a doubt as to the proper choice. The Sepia pains (of uterine origin) are all aggravated by sitting up, still more by standing, and most of all by walking. Relief comes by lying supinely, and this is often so complete that the whole condition seems altered as soon as the patient assumes the recumbent position. Now, the Belladonna patient gets no relief from recumbency, but is better when she stands, especially if she leans her head against something. Menstruation is generally too frequent and too profuse, though sometimes scanty and lasting but a day. The discharge is usually dark. The pains are relieved as soon as the flow begins. This agrees with Lachesis, but is the reverse of Pulsatilla. Leucorrhœa is almost invariably present; I should hesitate about the choice of Sepia if this symptom were altogether absent. The discharge, however, is of a varied nature both as to color, quantity, and concomitants. It is most frequently either yellowish and thick, milky and acrid, watery green mucus; reddish-green and offensive, or purulent, yellow-green mucus. The portal circulation is usually disturbed. As in Kali carb., cough—short, hacking, dry—is a frequent concomitant.

Lilium is one of our most effective remedies for dislocations and distortions. It seems to have the power, beyond every other remedy, to straighten a distorted or to replace a dislocated uterus. I have seen it do this many times, both when the uterus was tilted too far forward and when it was thrown backward out of place; and this without any mechanical rectification, the aid of a pessary, or any change in the habits or mode of life of the patient. I do not wish to be understood that it will do this in every case; far from it. In fact, I believe the number of cases in which Lilium will prove thus curative is very limited, and no matter how well selected, the remedy acts slowly, and is thus often abandoned before its cumulative effects have been realized. Its range is limited to those cases in which the initial disturbance was ovarian. The ovaries are not now perhaps especially troublesome, although I never saw a case of this sort where they were not, at least at the menstrual period, tender and painful, but at all events the history of the case proves that it was here that the disorder began. There is much bearing-down in the pelvis, especially during defecation, almost constant inclination for stool, painful pressure on the bladder, frequent desire to urinate, tenesmus vesicæ, voluptuous itching in the vagina, and soreness of the vulva. She is depressed, irritable, and restless; feels so hurried she cannot stop long enough to do anything properly; walks aimlessly to and fro; is sleepy before bedtime, but restless and wild after getting to bed, and suffers much from dull, paroxysmal headaches. There are generally functional heart complications. The menses flow only when the patient is moving about, and are usually scanty, thick, dark, and offensive. The leucorrhœa is very characteristic; it is profuse, bright-yellow (occasionally brownish-yellow), thin, acrid, excoriating the whole perinæum, and staining the linen brown. This peculiar leucorrhœa is pathognomonic. The bearing-down pain in the uterine region is relieved by sitting or lying-down, or by pressing with the hand upon the vulva. It grows worse through the afternoon, and so on to midnight, then better until the next afternoon, when all the symptoms of the previous day return.

Nux moschata is suitable for those hysteric women who never prespire freely, and who have also a peculiar and annoying dryness of the tongue and throat. She is sleepy all the time, a species of unconquerable drowsiness, amounting almost to a feeling of faintness. If she goes to sleep, when she awakens her tongue is so very dry that it seems to cleave to the roof of her mouth; still she does not feel thirsty. This peculiar symptom is exaggerated at the menstrual epoch, when the entire buccal cavity and pharynx are intolerably dry. There is much flatulence, not only in the stomach and abdomen, but in the uterus as well. The stools are soft but expelled with difficulty. Dysuria is pronounced, the urine being scanty, high-colored, and smelling like violets. The small of the back and legs are very weak. She feels as if she had had a very long walk, her legs are so tired, and yet she has not walked at all. The small of the back feels as though it were broken, it pains her so. It seems to her as if a piece of wood were lying across the small of her back and was being pressed from within outward. Her complaints make her disposition very changeable, one moment laughing, the next crying. Excessive hysterical laughter is as pathognomonic of this remedy as the peculiar dryness of the dermal and mucous tissues. A short time seems very long to her. She gives wholly irrelevant answers, uses wrong words, loses herself in a locality well known to her, and in other ways evidences the absent-mindedness so characteristic of this remedy. Though comparatively rarely used, it deservedly stands high in the treatment of uterine complaints with those who strictly individualize their cases.

Cocculus has a sort of rough resemblance to Nux moschata. Under both menstruation is irregular in time, scanty in amount, dark in color, and frequently replaced by leucorrhœa; both have weakness of the back and lower extremities; both have flatulent distension of the abdomen; and both have excessive dryness of mucous membranes. Both are stupid, but the Nux moschata patient's dulness is occasioned by sleepiness, while that of the Cocculus patient is caused by slowness of comprehension. The Cocculus patient stands on her dignity, she is very easily affronted, and is angry at every trifle; but the Nux moschata patient is an hysterical giggler. Both are preoccupied, but Cocculus is unobservant because her thoughts are introspective, while Nux moschata gives answers wholly irrelevant to the question put to her on account of her general indifference. Cocculus will be found suitable in those cases of uterine displacement that are accompanied with a paralytic pain in the small of the back, rendering walking difficult. This pain extends down into the legs, making them feel dead and useless. Even the bones (in the back) feel bruised; the knees, particularly, are weak; and the soles of the feet go to sleep while sitting. The uterine disorder causes nausea, and this is aggravated on rising in the morning, when riding in a carriage, or whenever she becomes cold. The urine is scanty, the desire to urinate frequent, and, what is unusual with scantiness, the discharge is pale. The characteristic pain of this remedy is the sensation as if the abdomen were full of sharp-cornered stones. This is associated with distension, but the passing of flatus does not bring relief.

Gelsemium is frequently indicated in the treatment of nervous, excitable, hysterical women with uterine displacement. If her troubles have been occasioned or aggravated by self-abuse, or if every excitement brings on an attack of diarrhœa, or if she suffers frequently from dizzy headache with blurred vision, as if the air were full of smoke, Gelsemium is a useful remedy. Her whole muscular system is weak, and she trembles greatly. Her legs are unable to support her, and she staggers as a drunken man. Various parts of the body feel numb, the extremities are cold, the mucous membranes are dry, and she is irritable and depressed. The pains in the lumbar and sacral region are dull and aching, but in the uterus severe and sharp, as if that organ were squeezed by a hand. Micturition is frequent, and the urine clear, limpid, and profuse. The peculiar visual symptom, "all objects appear very indistinct to her," has directed my attention to this drug, and repeatedly settled the doubt as to the choice of remedy.

Bryonia will frequently bring help to those slender women of bilious temperament and rheumatic tendency who are constipated, easily irritated, very morose, and whose sleep is broken by frightful or vexatious dreams. The uterus is very sensitive, she cannot bear the least pressure, and her pains are all aggravated by motion. She is unable to stand erect on account of a painful stiffness in the small of her back. Displacements with swelling of the uterus, if accompanied by the well-known characteristics of Bryonia, yield speedily to its influence.

Rhus toxicodendron is an important remedy for all uterine complaints caused by exposure to dampness. Washerwomen, and others who work in water, occupants of damp rooms, those who are suffering from having put on half-dried underclothing, or from getting caught in a storm, need this remedy. Even the most serious disorders may arise from so simple an initiative, and though of long continuance, are usually quickly cured by Rhus. I do not mean to say that a woman with retroflexion who once upon a time got a wetting must therefore receive Rhus, and will thereby be relieved of all her ailments. By no means. But it will happen that when the disorder plainly followed as a consequence of getting wet, or of a prolonged stay in a damp atmosphere, although this may have been years ago, a careful review of the case will show a marked and unmistakable resemblance to the pathogenesis of Rhus. The pains are worse in the morning, in wet weather, during winter, and while resting. They are relieved by hot applications, and temporarily by movement. The pains cause an irresistible desire to move, and each change of position is followed by transient relief; but if she continues the exertion she soon fatigues and her pains return.

Pulsatilla.—I have rarely used this remedy in displacements, and yet where these are the result of a metritis not yet subdued, how clearly in some cases the pathogenetic conditions of this drug are shadowed forth! If in any case the well-known mental characteristics and the sleep-symptoms of Pulsatilla were present, I should certainly look closely for other conditions indicating it.

Cyclamen is closely related to Pulsatilla, and doubtless the latter remedy is frequently given where the former would be more homœopathic. Cyclamen had a well established reputation among the ancients as a uterine tonic, although it has dropped long since out of use in the dominant school. Cyclamen differs from Pulsatilla in the menses being too frequent and too profuse, and by their being accompanied by a *semi-lateral* sick-headache and absolute blindness. The Pulsatilla headache is more general, and the blindness is incomplete and evanescent. The gastric symptoms are almost identical. The sleep is different from that of Pulsatilla. She goes to sleep late, has vivid dreams, wakens early, before daybreak, cannot sleep again, and on rising at the usual hour feels profoundly weary; while the sleep of Pulsatilla begins late, is sound, and the patient sleeps on through the morning hours. A peculiar symptom of Cyclamen is manifest in the breasts. They are swollen (in non-pregnant women) and feel tense. There arises from the abdomen and passes out through the nipple a sensation like a stream of air. The breasts do actually secrete a watery fluid resembling milk, which leaves upon the linen a stiffish stain, after which they feel relieved.

Borax acts very profoundly upon the female sexual organs, and deserves a thorough proving upon women. It is especially suitable to nervous, sensitive women who are sterile. The most characteristic symptoms are, a bland, white-of-egg leucorrhœa midway between the menstrual period, with a sensation as if warm water were escaping (*Bell.*); and the dread of any downward motion, as from a rocking-chair, descending steps, or riding. As under Belladonna, she is intolerant of light and noise, even ordinary light disturbs her. The skin also is hyperæsthesic, she feels as if there were cobwebs drawn over her face (Baryta).

Cimicifuga has three grand key-notes—restlessness, apprehensiveness, and sleeplessness. When these three symptoms are all equally prominent in a case of uterine displacement, Cimicifuga deserves study. It exerts a powerful influence on muscular fibre everywhere, as well as upon the nervous system, and nowhere more than in the genital tract. There is great tenderness over the uterine region, sensitiveness in the spine, and intense headache. The pain in the head is peculiar; it passes from within outward through the eyes and upward through the skull, which seems to open and shut whenever she moves. In those cases of uterine disorder in which the nervous system is deeply implicated, Cimicifuga will often accomplish what seems little short of a miracle; but the three characteristics must be present—restlessness, apprehensiveness, and sleeplessness—for it to act at all. A patient who sleeps fairly well, is quiet and stupid, and who dwells not on approaching calamities, will not be cured of any disorder by this remedy.

Magnesia mur.—Pain like a bruise in the small of the back; the part is sensitive to the touch. Restlessness in the thighs, must move them for relief. The pain in the back is aggravated by walking, but that in the thighs is worse when sitting. The leucorrhœa is most profuse during stool and after urinating. The stool is dry and crumbles at the verge of the anus. The urine can only be voided by bearing down with the abdominal muscles. The urethra feels numb. Magnesia is one of the remedies to be consulted when uterine displacement is associated with hysterical complaints.

Platina has the same kind of pain in the back as Magnesia mur., with the same aggravations and amelioration; and both remedies are characterized by an aggravation of most of the morbid sensations when at rest, with amelioration during motion. The vulva, vagina, and uterus are all sensitive. The patient experiences violent expulsive pains pressing downward (*Bell.*, *Sepia*). These begin gradually, increase in severity, and then decrease slowly. Even young girls suffer severely from nymphomania, caused by a voluptuous tingling in the genitals. There is a sensation of numbness in various parts—in the sacrum, in the thigh, in the malar bone, in the brain. The mental symptoms are peculiar. She becomes very haughty and proud, imagines herself superior to all those around her, and everything about her seems small and insignificant to her; at the same time she is horrified by the thought that she may soon die, and she is profoundly melancholic. Such a frame of mind associated with uterine displacement is a sure guide in the administration of Platina.

Lachesis is characteristically a left-sided remedy. With this is a symptom of dread of any form of pressure. She cannot bear to have her clothes tight about her, they must be worn loose. External pressure makes her worse, actually as well as sensationally. The leucorrhœa is slimy, greenish, and profuse. It stiffens her linen, leaving a greenish stain. Menstruation is delaying, scanty, and of too short duration, and preceded by a copious, acrid leucorrhœa. As under Platina, there are numb sensations in various parts. She is very melancholy, and anxious about herself; weary and languid, with constant desire for rest. The sharp pain in the os coccyx when sitting I have verified in a case of retroflexion.

Helonias has many uterine symptoms, and is useful in both anteversion and retroversion. The patient, though worn down with hard work, feels worse when lying idly than when busy. But while conscious that she is better when her attention is engaged, she is languid and likes to keep quiet. Her menstruation is very profuse and exhausting, continues for a long time, and is increased by any exertion. Sharp, cutting, and drawing pains pass from the back to the uterus. Urination is frequent, and the discharge profuse and light-colored.

The above remedies are those which I have used most frequently in the treatment of uterine dislocations and distortions; but there are many others of equal value. As has been so well said by Carroll Dunham: "The student of materia medica should at the very outset of his career begin to guard against a danger which often besets the physician and leads him astray in practice—the danger of regarding certain remedies as favorite remedies and looking at them with a partial eye; of allowing the high estimate in which he has been led by his accidental experience to hold them, to incline him to see indications for these favorites where such indications do not exist. You will sometimes hear an experienced practitioner speak of such or such a remedy as 'a favorite' of his. To say the least, this is a dangerous way of regarding any drug. If it lead him to give it where a strictly impartial judgment would not pronounce it more exactly homœopathic to the case than any other known drug, it prevents his curing his patient in the quickest and surest way. Science has no partialities and knows no preferences. Among the servants whom she puts at our disposal there is no possible position of honor for one above another. The drug which cures but a single case a year for us, because but one case in the year has demanded its administration, is as much entitled to our scientific regard as that which serves us every day." Adhering to the spirit of these words, we are often led to give, from the symptoms presented, remedies for a pathological state to which they at first seem to bear no real resemblance. Thus, the following may be consulted:

Aloe.—Fulness, weight, and dragging in the pelvis. Painful sensation as if the genitals were torn. Pain in the small of the back, pressing down into the rectum. A sensation as of a plug wedged in between the symphysis pubis and the os coccyx.

Alumina.—Throbbing pain in the vagina. Tickling in the sexual organs and down the thighs. Pains in the back as though a hot iron were thrust through the lower vertebræ. Inability to pass water except at stool.

Anatherum.—Pains in the uterus as if it were twisted and compressed. Burning pains in the uterus extending into the kidneys, with general weakness. Pressure on the uterus as if it would escape from the pelvic cavity. Swelling of the uterus. Spasms of the uterus. Sterility.

Arsenicum.—Intense burning pain in the uterus, worse about midnight. Excessive weakness and exhaustion.

Asterias.—Sensation of pressure in the pelvis, impeding locomotion. Distress in the uterus, as if it were being pushed out.

Aurum.—Induration of the uterus, with drawing and shooting pains. Burning and itching up the vagina. Excessive sensitiveness of the vagina. Constant dampness of the pudendum.

Baryta carb.—Throbbing in the small of the back. Heaviness just over the pubic bones. The leucorrhœa consists of bloody mucus. Tension as from a cobweb over the face.

Bovista.—Painful bearing-down in the vulva, and weight in the small of the back. Frequent micturition; urine bright-red with violet sediment. The menses flow only at night, and are dark and clotted.

Bufo.—Gnawing pain in the uterus. Polypi of the uterus. Itching and burning in the uterus and vagina.

Cactus grand.—Constrictive pains in the uterus (Sepia), with constriction in various parts of the body. Pulsating pain in the uterus.

Caulophyllum.—Sensation of congestion in the uterus. Pains radiate from the uterus to different parts. Endometritis with drawing pains extending down into the legs or up into the chest. Dragging pain in the small of the back.

Chamomilla.—Drawing pain in the small of the back. Smarting and burning in the vagina. Yellow, corrosive leucorrhœa. Pressure on the parts, like labor-pains, with frequent urination.

Collinsonia.—When displacement was occasioned by obstinate constipation. Stools consist of dry, light-colored balls.

Eupion.—Sensation as if the whole body were made of jelly. Backache so severe that she has to support herself agains something. The pain in the back extends to the pelvis, and when she stoops she can hardly get up again. As the pain in the back ceases, a leucorrhœal discharge runs from her. The leucorrhœa is bland, but is attended with great lassitude.

Ferrum.—Uterine displacements with catching pains in the sides of the abdomen, and the fundus of the uterus is found lying to the side where the pain is experienced. The patient is emaciated, anæmic, or chlorotic, and her face becomes fiery-red on the least emotion or exertion.

Graphites.—Women of abnormal corpulency. Bearing-down in the uterus, extending to the back, causing nausea. Pain in the uterus when reaching the arms upward. Violent lancinating pains through the uterus down the thighs. Leucorrhœa discharged in gushes. Leucorrhœa in place of the menses. Various local œdemæ—eyelids, vulva, hands, and feet.

Iodum.—The leucorrhœa is thick, yellow, and corroding, most abundant at the time of menstruation, rendering the thighs sore and eating holes through the linen. Dwindling of the breasts. Emaciation with good appetite. To women with chronic uterine disorders, which have brought them to a cachectic state, Iodum is often of the greatest benefit.

Kali bichromicum is a most valuable remedy in subinvolution, a condition which often leads to the most serious uterine displacements. One of its most characteristic symptoms is the pruritus of the vulva. This is not caused by an excoriating discharge, as in Kali carb., but is a true pruritus. The leucorrhœa is stringy and tenacious, but it is not corrosive.

Kali ferrocyanatum.—A splendid remedy in flexions. The uterus is very sensitive to touch. Sensitiveness of the pelvis to pressure. Menstruation delaying. Leucorrhœa like pus; profuse, but not irritating.

Kali nitricum.—The menstrual discharge is black as ink. Pain in the small of the back. Legs feel as if they were made of wood.

Kalmia.—Pain in the lumbar region with weariness of the extremities. Stools like mush, followed by pressure on the rectum. Frequent micturition of large quantities of yellow urine.

Kreasotum.—A valuable remedy when the discharges are putrid. Dwindling of the breasts (Iodum). Uterine diseases with buzzing and humming in the head.

Lobelia.—Sense of great weight in the genital organs. Violent pain in the sacrum, she cannot bear the slightest touch; cries out if an attempt is made to examine the parts.

Lycopodium.—Displacements caused by polypi or other growths.

Mercurius.—A very valuable remedy when indicated by the general condition of the patient.

Natrum carb.—Pressing in the hypogastrium toward the genitals, as if everything would be forced out. Movements in the uterus as from a fœtus (Crocus). Symptoms worse at the full moon (Sil.).

Natrum mur. is especially applicable to those cases that have been treated topically by Nitrate of silver.

Nitric acid.—Violent bearing-down pain as though the whole pelvic viscera would be pressed out of the vulva. Frequent desire to urinate; the urine has an intolerably strong smell; it feels cold as it passes. Burning and prolapse of the rectum. She loses her breath, she is so weak.

Nux vomica.—Cutting or burning pain in the uterus, with severe backache; she must sit up in order to turn over in bed. Painful urging to urinate. Constant, ineffectual desire for stool. Over-sensitiveness to odors, noises, and light.

Palladium.—Sharp, knife-like pains in the uterus, aggravated by motion, relieved by lying down. Frequent micturition, the bladder feels full, but little urine is passed.

Phosphorus.—Pain in the small of the back as if it were broken. Painful bearing-down in the uterus and bladder, causing smarting on walking. Stitches upward from the vagina into the uterus. Corrosive, blistering leucorrhœa.

Prunus spinosa.—Small of the back feels stiff, as from over-lifting. Troublesome urging to urinate; she has to press a long time before passing any urine. Daily sanguineous discharge between the menstrual periods.

Sabina.—Dragging pain in the lumbar region from behind forward, extending through to the pubes.

Stannum.—Pains running up the vagina to the spine after urinating. Great melancholy before menstruation, which passes away during menstruation.

Trillium.—Menorrhagia caused by uterine displacements; discharge bright-red.

Ustilago.—Uterine displacements with hæmorrhage of dark, fluid blood. Aching in the uterus.

Zincum.—She has to sit down and bend backward to pass urine; even then she passes only a little, although she feels as if the bladder would burst from over-distension. Pains in the small of the back, worse when sitting. Itching at the anus and in the vulva, causing nymphomania.

IRRITABLE UTERUS.

BY JULIA HOLMES SMITH, M.D.

Definition.—The term "Irritability" of the uterus implies a condition of the organ in which it may be considered as neither *sick nor well;* if at rest, it is comfortable; yet, the womb is so morbidly sensitive to pain that the least pressure, a misstep in walking, the rumbling of a carriage, provoke hysteralgia; but, this irritability is not the result of structural or functional change. This condition is limited to the periodic life of women, it occurs more often in persons who have been pregnant, and it is never observed before puberty. Tilt insists that "irritable uterus independent of inflammation can only be hysteralgia," and Schroeder makes the two maladies equivalent. But it seems to me that while hysteralgia is a distinct disease of the nerves of the uterus, irritability merely means *sensitiveness*, it may be to pain, enlargement, inflammation, any pathological condition which circumstances may induce.

Ætiology.—Among the causes of irritable uterus may be included nearly all those conditions which give rise to uterine disease of any kind. "In addition to its necessary relation to the ganglionic nervous system, the womb, although not immediately subject to the voluntary nervous system, is abundantly supplied with nervous filaments, and most intimately connected with the entire cerebro-nervous system and sensitive sphere of the whole female body,"* hence any weakness of the general nervous system would likely express itself in the uterus, and the woman would be liable to some manifestation of disease. Too frequent child-bearing is an active cause of this irritability; then, too, we may enumerate abortions, which so gravely disturb the rhythmic life of the woman, subinvolution, lacerated cervix, the injudicious use of caustics upon the uterine neck, long walks, skating, dancing, horseback-riding in excess, incomplete coition, dislocation of the womb, ovarian irritation, and sometimes malarial poison.

Symptomatology.—Pain is the prominent symptom. It is usually located in the pelvis, is deep seated, sometimes extending to the back and down the loins. Occasionally it is a pulsative pain, then sharp lancinating. One woman will describe her condition as a soreness, which makes the pressure of clothing uncomfortable. Another patient will speak of it as a radiating pain which extends to the rectum. There may be vesical and rectal tenesmus, and the nervous irritability is at times so great as to induce spasmodic action.

The attack of pain may result from sudden shock of grief or anger, and it is a notable peculiarity of the pain in an irritable uterus that the distress ceases when the attention of the patient is diverted from herself.

Great discomfort is experienced in going up and down stairs, and there may be a sensation of burning in the pelvis similar to that caused by chronic ovaritis. Finally we may meet in the same case many neurasthenic symptoms, such as restlessness, fretfulness, insomnia, dyspepsia, etc.

Diagnosis.—The diagnosis is difficult, and can only be positive after repeated and careful examinations of the case; the patient, by ascribing much importance to mere trifles, will often mislead the physician.

The differentiation from inflammatory diseases is readily made, for though there exists tenderness on pressure of an irritable uterus, there is no heat and no discharge. The fact that the pain appears at any time rather than at the menstrual period prevents confounding an irritable uterus with dysmenorrhœa. Spinal irritation has very similar symptoms, and many writers include the pain of the irritable uterus with spinal neuralgia.

Prognosis.—An absolute cure of this condition is not readily, if at all, accomplished. It is a difficult task to eradicate bad and established habits, and this species of irritability is one of the worst habits the uterus can acquire. There is such an hyperæsthesia of the nervous supply that the physiological hyperæmia of the sexual apparatus fairly tortures the filaments of the nerves distributed to the mucous membrane which lines the uterus, and their protest is pain in various degrees of intensity.

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* Guernsey's Obstetrics, page 666.

Treatment.—Remove, if possible, the cause of the irritability. If a cicatrix is found, resulting from the careless use of caustics, or laceration of the cervix, by all means remove the hardened tissue, let loose the imprisoned nerve, and thus secure health. If resulting from subinvolution, remove that by appropriate treatment. Give the uterus as nearly complete rest as can be secured during periodic life. Little, if any, sexual indulgence should be allowed. Establish proper hygienic habits, and prescribe rich, nourishing food. No stimulants are to be permitted. The patient must sleep in a cool room. Massage, cheerful society, and occupation which interests but does not over-fatigue are commendable. Injections into the vagina, of chamomile or hop tea, and even clear hot water, soothe the nervous irritability of the parts, and I have found a tampon lightly medicated with a little glycerine and chloroform of great value when the irritability takes on neuralgic pain.

The faradic current may prove beneficial, but should be used with caution, as such patients are peculiarly susceptible to electricity.

Therapeutics.—**Belladonna.**—When there is a sharp, lancinating, throbbing pain in the uterus; the patient is sleepy but cannot sleep, dreams of children, and of being on fire. The uterine pain is apt to come on after exercise, consequently the woman dreads every exertion.

Gelsemium.—The patient is irritable, complains of vertigo, is restless and "fidgets about the room," thinks all the while "she has female weakness," yet no lesion is discoverable. Especially valuable in malarial regions.

Cimicifuga.—When there is a rheumatic diathesis, especially if the patient be moody, and complain that her life lies always in the shadow.

Calcarea.—If the patient perspires easily and is poorly nourished; has flying pains about the pelvis.

Coffea.—Guernsey says this "is one of our best remedies for over-sensitiveness to pain." Hence it should be of value for an irritable uterus, especially whenever the pain in the womb extends toward the hip-joints; there is headache as if a nail were being driven into the head, and dysuria, with the discharge of very little clear urine.

Pulsatilla is indicated chiefly by its characteristic, sensitive temperament.

Rhus radicans.—Should be useful in cases showing rheumatic tendencies.

Consult also *Arsenicum*, *Ferrum*, *Ignatia*, *Aconite*, *Strychnia*, *Nux*, *China*, *Veratrum*, *Sepia*, and others.

HYSTERALGIA.

BY JULIA HOLMES SMITH, M.D.

Synonyms.—Uterine neuralgia, Uterine colic.

Definition.—Pain of a neuralgic character in the uterus, sometimes extending through the pelvis. The neuralgia may be persistent or remittent, not resulting from any structural lesion, and causing changes in the pelvic viscera only by its influence on the general health.

Ætiology.—Some of the causes of hysteralgia are such as would produce neuralgia in any other part of the body. Sudden chill, which may arise from wetting the feet or sitting on the damp ground at a time when there happened to be a congested condition of the sexual apparatus, may produce neuralgia. The very reprehensible, but common, practice of using a cold vaginal injection to prevent conception, by causing a stasis of the blood in the capillaries, engorged, as they are, after coition, and the pressure of the overdistended vessels upon the nerves, causes pain. Incomplete sexual intercourse and masturbation are causes of hysteralgia; the reason is obvious, for in either case there exists intense nervous irritation of the genitalia without legitimate gratification; the outraged filaments protest, and their speech is pain. The hysterical and rheumatic diatheses predispose to uterine colic. The presence of malarial poison may manifest itself in neuralgia of the womb; the hysteralgia from this cause is characterized by marked remissions, and the onset of the pain is apt to be accompanied with rigors.

There are no characteristic changes in the uterine tissue except such as would result from reflex influence upon the general health.

Symptomatology.—The most prominent symptom of hysteralgia is intense pain which is often paroxysmal. The patient may liken it to a "knife running through, from before backwards," or at times it is described as a "misery" running around the hips down the thighs, rapidly reaching its acme, then gradually dying away until it disappears. There may be a chill, premonitory of the hysteralgia, the hands and feet become cold, and hysterical symptoms, tears and temper, are not uncommon. If a physical examination is made, in the case of a nullipara no lesion is found to account for the pain. The existence of a laceration of the cervix may, however, be found in a uterus impregnated. There is no heat or tenderness on pressure, and the organ is not necessarily displaced. The malady is entirely an affair of the nerves, and should be treated as such. The uterus is "fairly alive with nerve-filaments," and because the brain, through the intimate relations of the ganglionic and cerebro-spinal systems, shares in a greater or less degree any and every disturbance in the "ovario-uterine circle," we find depression of spirits, pain in the eyes, and sometimes a monomania, caused by the pain of hysteralgia.

Diagnosis.—The diagnosis is not difficult. The absence of inflammatory action, the periodicity of the attack, the history of the case, the locality of the pain, the fact that it is usually relieved by pressure, are all indications that a nervous condition exists. The differentiation from cancer is readily made, since in the latter the finger would detect either "stony hardness" or else offensive sanious leucorrhœa.

Neuralgia of the uterus is easily distinguished from coccygodynia, because in the latter the patient cannot endure pressure on the *os coccygis*, while in hysteralgia the favorite position, with the limbs pressed against the abdomen as the sufferer sits up in bed, throws all the weight of the body on the very end of the spine.

From rheumatism of the uterus the differentiation is difficult and indeed it is more than probable there is a rheumatic element in all neuralgias, and *vice versa*.

Treatment.—The nervous system should be strengthened by the use of the so-called "nerve-foods,"—phosphates and malt. If the patient be anæmic, pains must be taken to remove this condition by appropriate treatment. The general health must be restored by careful attention to hygiene, an abundant supply of good food, cultivation of regular habits, securing a sufficient amount of sleep and systematic bathing; the latter, however, is to be used with moderation, as many women induce prostration by the excessive use of the bath. There must be entire avoidance of cold vaginal injections; a healthful moral tone is to be secured, and both overwork and idleness are to be deprecated.

Of the many remedies suggested the following have been especially serviceable in my own practice:

Asa fœtida.—When the pain is in the hypogastrium, and the patient feels as though it would be a relief to discharge flatus through the rectum, I have derived marked benefit from the exhibition of this drug in material doses (two-grain pills).

Bryonia.—When the symptoms point to a rheumatic complication; pains sharp and worse on motion; characteristic gastric symptoms and constipation.

Ignatia.—When the pains are tearing and shoot up to the umbilicus; there is great nervous irritability and colorless urine.

Conium.—When the pain extends to the ovary on the *left* side and there is soreness of the mammæ.

Gelsemium.—Cramping pain, preceded by a chill; later, perspiration on hands and feet.

Ferrum et strychnia.—In cases associated with anæmia.

Platinum.—When the pain is paroxysmal, alternating with numbness of the limbs.

Valerianate of zinc.—When the colic causes the patient to lie on her face, and the pain extends down the limb towards the foot.

As adjuvants, hot vaginal injections of hop tea, hot compresses over the uterus, and often chloroform liniment are very useful.

LEUCORRHŒA.

BY JULIA HOLMES SMITH, M.D.

Synonyms.—Fluor albus, Blennorrhœa, Whites, Metrorrhœa.

Definition.—The term leucorrhœa includes any discharge, othe than menstrual fluid or blood, from the genitalia, abnormal in quantity and quality. Such flow may arise from benignant morbid actio or it may be the characteristic discharge of cancer, or it may be caused by the action of gonorrhœal or syphilitic poison.

Ætiology.—As the term leucorrhœa may be applied to so slight an increase of the natural secretion as scarcely to be termed pathological in character, it is necessary to have clearly in mind the various forms of discharge which normally lubricate the generative canal. The external organs are rich in fluid-producing glands and follicles. Sebaceous follicles are found on the clitoris, labia, and nymphæ. Just at the vaginal orifice are muciparous follicles and the vulvo-vaginal glands, all secreting a viscid fluid of neutral reaction and very readily provoked to hypersecretion.

The vaginal mucous membrane contains mucous glands and follicles which are especially numerous around the cervix, and the discharge from these keeps the parts of the uterus and vagina which are in apposition from chafing one against the other. The structures mentioned secrete a clear, transparent fluid, mixed with many pavement epithelial cells, and acid in reaction. In appearance it sometimes resembles saliva because of the presence of air-bubbles; sometimes it looks curdled, and Hewitt attributes this to the precipitation of albumin by the acid of the secretion. Inside the cervical canal are many mucus-glands capable of enormous activity. Their secretion is clear, viscid, and stringy, like uncooked white of an egg, the reaction being alkaline. The mucous glands in the body of the uterus are comparatively inactive. Their product, small in quantity, is much more watery than that from the cervix, but is also clear, albuminous, and of alkaline reaction.

Any cause producing pelvic congestion tends to increase at once the amount of secretion. Thus, before and after menstruation, there is an increase which is purely physiological. The same is true during sexual excitement, the glands of the vagina and cervix responding to the stimulus of coition. A hypersecretion is often consequent upon physical exercise, as a long walk, a ride on horseback, or continued dancing, but after repose the mucous membrane returns to its normal state. Thus the boundary line between healthy activity and morbid action is very narrow, and careful differentiation is essential.

A common cause of leucorrhœa is exposure to cold, whereby a catarrh of the mucous membrane lining a part or all of the genital tract is produced. This excessive secretion is similar to the catarrhal discharge from the nose and throat with which it is sometimes associated, but not often; fortunately, it is seldom that the mucous membrane in all parts of the body is equally active in morbid processes at the same time. A frequent repetition of this process of "taking cold" tends to produce a chronic catarrh and degeneration of the mucous membrane, and exhaustion from the long-continued excessive discharge may occur.

The suppression of menstruation is sometimes followed by a fluent leucorrhœa. General anæmia may be an ætiological factor, in which case the leucorrhœa takes the place of the menstrual flow. Over-stimulation of the sensuous nature by novel-reading, dramatic representations, or too intense application to music, are all potent causes of leucorrhœa in young girls, and many times, by the relaxation incident to excessive glandular action, the vaginal walls are weakened, and displacement of the uterus results. Again, uterine displacements, flexions, subinvolution, and morbid growths which interfere with circulation or determine an undue amount of blood to the pelvis, cause leucorrhœa.

Laceration of the cervix causes leucorrhœa, because the glands of the mucous membrane, which are normally *within* the neck, are, by the rent in the cervix, exposed to friction against the walls of the vagina; this chafing causes at first a hypersecretion of normal fluid, later erosions, ulcerations, and granulations are produced, the character of the cervical discharge changes, and the leucorrhœa becomes of an acrid, offensive nature.

Sarcoma, polypi, and cancer are causative of leucorrhœa. And we may also enumerate all inflammatory diseases of the uterus and its appendages, for, unless death results speedily from the onset of the fever, the discharge from the mucous membrane follows as a matter of course.

Chlorosis and anæmia not unfrequently have this symptom. It is also likely to appear in women who fail to nurse their children; the involution of the uterus after delivery is retarded in such cases, and leads to the establishment of uterine affections of which leucorrhœa is a concomitant; still more frequently, however, does undue lactation, by tending to induce an anæmic condition, cause a very profuse and correspondingly exhausting discharge.

Leucorrhœa may occur as one of the complications of malaria, and nearly all the maladies peculiar to women express themselves by some discharge from the genitals which differs in character as its causes vary.

The leucorrhœa of children is *nearly always* the result of the migration of worms from the rectum to the vagina, or of vaginitis produced by the pernicious habit children acquire of sitting on cold steps or on the damp ground. Masturbation leads to the same result.

During gestation leucorrhœa is very prevalent, and Dr. Ludlam, at a recent meeting of the "Western Academy of Homœopathy," asserted "that fluor albus during pregnancy seems to take the place of morning sickness." I cannot verify this statement from my own experience. The troublesome discharge during pregnancy is due to the hyperæmia of the mucous membrane which results from the gradual hypertrophy of the uterine and vaginal walls incident to that condition.

Pathology.—If the leucorrhœa be simply a vaginal catarrh, there is materially increased vesicular action. Fritsch[*] claims that "vaginal catarrh in the ordinary sense is impossible, because the so-called mucosa is no mucous membrane, but an epidermis, and contains no organs secreting mucus. Catarrhal secretion consists of quantitatively increased normal secretion and pus-corpuscles. Therefore, as the vagina passesses no secretion, a catarrh is as *impossible as a catarrh of the external skin.*" Surely then, our author, by this last sentence, condemns his own theory, for eczema is a recognized catarrh of the skin with variable discharge.

There is a flow of acid plasma, holding in suspension pavement epithelium, fatty matter, and sometimes blood-corpuscles and pus. This discharge looks like slightly curdled milk, is white or yellowish in color, and varies in quantity.

Cervical leucorrhœa is very viscid, hanging usually in long transparent strings, or coming away in coagulated lumps. This contains mucus, albumin, cylindrical epithelium, possibly pus-cells, fatty particles, and blood-corpuscles. If cervical congestion be so intense as to cause a puriform secretion, the flow loses its clearness and becomes opaque and yellow; it is also discolored when due to the action of gonorrhœal poison. If there be malignant growths upon or within the cervix, the characteristic discharge will be unmistakable.

From the uterine body leucorrhœa, when merely a hypersecretion, will be watery, albuminous, with a little mucus. But if due to endometritis, it may be muco-purulent, sanious, or even tinged with blood. Sometimes in old women, in whom the uterus has nearly atrophied, there will be discharged directly from the endometrium a thin, watery, unirritating fluid, the result of abortive efforts on the part of the membrane to renew its youth.

Symptomatology.—If the discharge be due to simple catarrh, uncleanliness will be the only symptom complained of, unless the flow become unusually acrid, in which case excoriations are likely to result, causing irritation and soreness wherever it touches.

If due to displacement, subinvolution, or uterine growths, there will be the characteristic symptoms of these conditions, as pelvic pain, backache, weakness of the limbs, nervousness, and general debility. If anæmia or chlorosis be the cause of the leucorrhœa, there will be observed the characteristic change in the general condition of the patient, defective innervation, digestive disturbances, and alteration in the constituents of the blood. A sense of weakness and the discomfort caused by a constant discharge, possibly pruritus, are usually the symptoms of which the patient complains to her physician, and the ætiology of the malady can only be ascertained by examining the discharge in order to determine, if possible, from what part of the genital tract it proceeds, and whether the cause be local or constitutional.

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[*] Diseases of Women, p. 93.

The different leucorrhœal discharges are described as uterine, cervical, vaginal, and vulval; or, if classified according to the predominating quality, as mucous, muco-purulent, purulent or puriform, and sanious.

Diagnosis.—As the leucorrhœa appearing at the vulvo-vaginal orifice is composite in nature, it is difficult to tell which is the predominant element. If there are no symptoms but a discharge of the characteristic appearance of the vaginal secretion which changes the litmus paper, we may consider the flow simply a catarrh, and forego any further exploration; or if the patient be chlorotic or anæmic, and the local disturbances, including the leucorrhœa, exist only in proportion to systematic derangement, it is safe to diagnosticate simply abnormal secretion. If the backache, bearing-down, ovarian trouble, and pain in the limbs are more pronounced, or the history of the case points to pelvic causes, careful local examination must precede a positive diagnosis.

To determine positively in which part of the genital tract the discharge originates, it will be safe to apply Schultz's test, because the alkaline secretion of the uterus and neck may be mingled with the acid secretion of the vagina, and the examiner be misled. Schultz, after inserting the speculum and carefully cleansing the cervix, applies a tampon soaked in glycerine, fitting it closely around the neck; this is removed in twenty-four hours. The discharge on its upper surface will necessarily be that which comes from the lining membrane either of the cervix or the body.

It is an important point in diagnosis to differentiate between gonorrhœal discharge and leucorrhœa. The former has its peculiar history of infection; its discharge is purulent, and is, of course, contagious. Furthermore, in gonorrhœa the discharge and pain begin in the urethra, and make their way from there to the lining of the vagina; in the non-specific discharge from the uterus and vagina, the opposite order is observed.

Treatment.—The constitutional treatment should go hand in hand with the local, and is usually of paramount importance.

If anæmia or chlorosis exist, in addition to constitutional remedies for restoring and vivifying the blood, the diet should be chosen with reference to such a condition; milk, beef-juice, and mild stimulants should be prescribed to help repair the extensive waste. Salt-water sponge-baths, tepid or cold, as best borne, are very strengthening. If the patient is not able to take exercise, massage is commended. Habits of life should be strictly hygienic. For local cleanliness and comfort daily vaginal injections may accompany the general treatment. These may be of hot water alone, which is of itself a tonic, or a little alum, tannin, white-oak bark, sulph. of zinc, or Hamamelis may be added. The medicating substance should be varied from time to time, as too long a continuance neutralizes their effect. Salt-water as a vaginal douche is pleasantly stimulating and antiseptic. If the discharge has caused tenderness and excoriation, fluid extract of *Hydrastis*, one part to ten of water, is invaluable; *Pinus canadensis* and Balsam of Peru may be used in the same manner.

In selecting a medicament, the nature of the discharge and the pathological condition of the mucous membrane should always be taken into consideration. No astringent should be used while inflammation exists. The remedies previously mentioned to be used in the douche are useful when the leucorrhœa depends upon a local exciting cause, but of themselves will certainly not be sufficient to cure. Flexions or displacements must be remedied, and endometritis and cervicitis are to be treated as suggested elsewhere. If the cause be irremediable, as intramural fibroids, cancerous growths, etc., or if the constitutional dyscrasia be incurable, injections will be palliative only.

The application of medicine per vaginam is readily accomplished by means of suppositories containing astringents or alteratives in suitable quantity. These should be prepared of cacao butter. For application directly to the cervix uteri remedies may be mixed with glycerine and a little carbolized water, in which mixture a small tampon of cotton is soaked; the latter is pushed up to the cervix and allowed to remain during the night. This treatment is valuable in two ways: it receives and retains the discharge from the uterus which possibly excoriates the vaginal mucous membrane; it also separates the vaginal walls and prevents the friction which in a hyperæmic condition of the membrane, and in the congested state of the follicles, necessarily aggravates the discharge.

In case of offensive discharge from cancer, cauliflower excrescences, etc., antiseptic injections are the most useful, especially carbolic acid, bromo-chloralum, Platt's chlorides, salicylic acid, or boracic acid.

Therapeutics.—**Calcarea carb.** is indicated in cases of imperfect nutrition, if the skin be "waxy" in appearance. The patient is often fleshy, but not muscular.

Hydrastis is useful when the discharge, which arises from the cervix uteri, is thick, tenacious, yellow; the patient is afflicted with gastric catarrh, and suffers from constipation.

Pulsatilla.—For fat and fair patients, with flatulent dyspepsia and a leucorrhœa which smells sour after it has dried on the clothing. Especially valuable when menstruation has been suddenly suppressed.

Sepia.—Leucorrhœa greenish-yellow, profuse watery, accompanied by a "gone feeling" at the epigastrium and a pressure downward of the uterus. The vagina of a Sepia patient is often very lax, and the uterus heavy.

Mercurius.—Leucorrhœa smarting, excoriating, thick and yellow, worse at night, causing itching at the vulva.

Nitric acid.—Green or blood-tinged, excoriating discharge. The Nitric-acid patient is inclined to sweats.

Creosote.—Thick yellow, or watery and white leucorrhœa, which is fetid, acrid, and excoriating, causing a burning of the vulva. An invaluable remedy.

Arsenicum.—Leucorrhœa from the body of the uterus, watery, smarting, and acrid. Constitutional anæmia and malarial conditions call for *Arsenicum*.

Schuessler's tissue-remedies possess great value in the treatment of leucorrhœa by their constitutional action upon the patient, and their careful study is to be highly recommended.

ENDOCERVICITIS.

BY JULIA HOLMES SMITH, M.D.

Synonyms.—Cervicitis, Catarrh of the neck of the uterus, Cervical leucorrhœa.

Definition.—Acute or chronic inflammation of the mucous membrane lining the cervix uteri from the external to the internal os. This is the most frequent of all the diseases of the uterus, and, according to the majority of writers, may exist alone or be accompanied by inflammation of the endometrium of the body.

Ætiology.—The acute form of this disease may result from a sudden check of the menstrual flow, exposure to cold, cold or medicated douches to prevent conception, forcible coition, extension of vaginitis, or from traumatism in attempts to produce an abortion or during labor.

Chronic endocervicitis may be a sequence of the acute form, or may arise in a subacute fashion from impoverishment of the system by constitutional diseases, as scrofulosis, tuberculosis, or chlorosis. It may also result from frequent abortion, too often recurring pregnancy, laceration of cervix, and subinvolution.

The cervical glands are more complex than those of the body. During pregnancy these undergo extensive hyperplastic changes, and, in the non-puerperal, congestion, or a general hypertrophy, causes a marked glandular activity and hypersecretion.

Displacements, notably retroflexion, cause cervical inflammation. In the nullipara a contracted external os may prevent the escape of normal secretions which accumulate, expand the cervical cavity, and act as an irritant, causing persistent chronic inflammation.

Pathology.—Glandular enlargement with abnormal secretion, in one form or another, is the pathological condition of nearly all diseases of the cervix, excluding, of course, malignant growths. The glands are of the racemose variety, lined with cylindrical epithelium, opening between and upon the folds of the mucous membrane which covers the cervical canal. Just without the os externum, however, the membrane is similar to the epidermis, covered with pavement epithelium, and contains normally no glands opening upon it. When, however, from any cause the cervical glands become unusually active, there is exceedingly rapid proliferation of their epithelial cells, and if any part of the pavement epithelium upon the vaginal portion happens to be abraded, it is immediately replaced by the cylindrical variety. This it is which, lying upon the reddened erosions, was formerly mistaken for an ulcer, but is now best described under the term "catarrhal patches." So rapidly do the cylindrical cells replace the others, that when they once gain a foothold they even push their way underneath, and detach those of the pavement variety which have been undisturbed. At the same time that the epithelium covering the glands is making this rapid encroachment, the glands themselves branch out and enlarge; their projections and the depressions between them give to the newly-formed "patch" that uneven appearance usually denominated granular degeneration, and which has until recently been considered projections of villi from the mucous membrane. If there be excessive proliferation of the cylindrical epithelium or of the glands, the protuberances are greater, and the erosion becomes papillomatous in appearance. These newly-formed surfaces secrete and discharge mucus, as do those glands through their natural outlets, into the cervical canal. It often happens that from resistance of the tissues surrounding the glands, and from pressure of the congested vessels running between them, as well as from their own crowded condition, this secretion cannot escape, but is dammed up, distending their channels, forming retention cysts or enlarged *ovula Nabothi*. When there are a number of these we have a follicular erosion, that is a collection of distended acinous glands covered by cylindrical epithelium. Continuing to multiply, some of them are pushed beyond the others, separating the connective tissue at the point of the least resistance, and when once freed, which more often happens into the cervical canal, they hang as polypi, gradually acquiring a longer stem and frequently proliferating rapidly. These polypi are covered with the same cylindrical epithelium which lined them when within their natural limits, though it is thought possible that after a time it may change into the pavement variety which lines the vagina. Not unfrequently the cysts push themselves free from the vaginal portion instead of through the cervical canal, and hang like pendants, or stud the surface with bluish-red or bluish-white protuberances. Sometimes these *ovula Nabothi* lie far beneath the surface, and glandular changes may go on to such an extent that the connective tissue is almost completely displaced, and the cervix becomes a cystic mass. Now and then one gland and its branches overcomes the tissue resistance of the vaginal portion and, protruding into the vagina, proliferates until it becomes of the size of an orange. Its surface is very irregular and after a time covered with vaginal pavement epithelium, so that, though really similar in origin and anatomical structure to the mucous polypi, it has a totally different appearance, and is the result of persistent endocervicitis.

Symptomatology.—The vagina in the early stage is hot and dry, and an examination is exquisitely painful. There is pain in the back and down the thighs, with slightly elevated temperature. After a few days, as in the case of all catarrhs, a thick yellow, purulent discharge bathes the parts, and while the heat is relieved we get most irritating pruritus. In the traumatic variety the pain is most intense, the discharge mixed with blood and degenerate pus-corpuscles, which are septic in character, and there is a most pronounced constitutional disturbance, loss of strength, dull headache, nausea. The chronic form presents the symptoms common to many uterine ailments, *i. e.* weight in the pelvis, vesical and rectal tenesmus. There is present also leucorrhœa, viscid and ropy, from the Nabothian follicles, and neurasthenia in some of its manifestations and reflex dyspepsia are noted. In cervicitis, the result of gonorrhœa, there is an accompanying dysuria with scalding urine, the onset of the disease is very sudden, and we find the history of infection.

Varieties.—(*a.*) *Simple superficial cervical catarrh* with thickening of the mucous membrane. (*b.*) *Glandular cervical catarrh* with excessive proliferation of cylindrical epithelium and enlargement of the glands. (*c.*) *Cystic degeneration*, consisting of partially retained secretions and excessive development of *ovula Nabothi.* (*d.*) *Gonorrhœal cervicitis*, an inflammatory process produced by contact with specific poison.

Diagnosis.—It is rare that the physician is called in time to make an examination of the hot, dry stage of acute endocervicitis. If he does examine, the touch reveals heat, tenderness, enlargement or swelling of the membrane and, later, undue secretion; in the multipara a patulous os, dry and hard, while the virginal cervix is found with a small os, hot and tender, from which is not manifested any discharge of mucus until the insertion and removal of the sound, when the leucorrhœa follows in long tenacious strings. The speculum confirms the touch, and also discloses the plug of mucus clogging the canal, and red spots of varying size—"catarrhal patches"—at irregular intervals inside and out of the canal. Ovula Nabothi are not always present, but are frequently visible, either seen through the tissues as bluish-red protuberances, or else hanging like polypi from the os.

A differential diagnosis between *endometritis* and *endocervicitis* is difficult, wellnigh impossible, for without sight of the line of demarcation we cannot say where inflammation ends. Many authors contend that the one cannot exist without the other. If, however, there be endometritis complicating a simple cervical inflammation, there will be tenderness at the fundus, and the sound will return blood-tipped from its exploration. Should the speculum reveal a large mucous cyst bulging into the cervical cavity, and at the same time there is menorrhagia, sarcomatous infiltration may be suspected, but a trocar by its puncture will bring away fluid rich in mucus and pus-corpuscles, and settle the question in the negative. Large erosions must be carefully differentiated from carcinoma; the absence of fetor and the history of the case will aid the diagnosis.

Prognosis.—Of acute endocervicitis under favorable conditions the prognosis is good. When called to give a prognosis in chronic cases, the constitutional dyscrasia, the surroundings of the case, even the temperament of the patient, become factors for consideration.

The cure is certainly possible if patient and physician work together, unless the case has progressed to *cystic degeneration*, in which case the prognosis must be guarded.

Concerning the possible results of persistent endocervicitis, one may expect the long catalogue of ills incident to chronic invalidism. Reflex nervous disturbances may rob the stomach of the power of digestion; there follow defective nutrition, anæmia, depression of spirits, melancholia, sterility. Or else, active degeneration of cell-tissue ensues, the ovula enlarge, form vascular polypi, and endanger life, unless operative interference be invoked.

Treatment.—In acute endocervicitis the method employed should be the same as that adapted for sore throat.

Belladonna is useful when the attack has been caused by exposure to cold. When there is chilliness alternating with heat and a dry, hot, sore feeling of the parts. The writer has found the remedy to act well in conjunction with Mercurius.

Apis mellifica.—The patient complains of a "pricking" pain when moving or sitting; the head aches, the eyes look glassy, and there is constant urging to urinate, which gives no relief.

Hepar sulphur.—When the discharge is thick and yellow. The pain in the uterus seems pulsating. Scrofulous diathesis.

Kali bichromicum.—When there are catarrhal patches on the cervix, and the discharge can hardly be wiped off, it is so stringy.

Lachesis.—When there is a shrivelled look to the cervix, and there are radiating red lines over the surface.

A recumbent position is essential. The patient must go to bed, and a gallon of hot water must be given as vaginal injection three times a day. Hot slippery-elm water is very valuable, used as a *douche*. If the catarrhal patches are not healed in this way, a solution of *Potassa permanganate* should be applied with a camel's-hair brush, as customary for ulcers in the throat. Sexual indulgence must be entirely forbidden, and the horizontal position maintained to relieve the hyperæmia of the cervix.

For superficial cervical catarrh vaginal injections should be ordered night and morning. In very obstinate cases it is well to apply a tampon to the cervix in either the glycerole of Hydrastis, Pinus canadensis, or Sanguinaria. In the use of the last-mentioned remedy I have been peculiarly successful. The indications for its use are a swollen cervix, with the membrane having the appearance of being blistered.

For the *glandular cervical catarrh* still more heroic measures are needed. If in the *nullipara* the os is very narrow, it should be dilated with tents which many a time by their pressure destroy the glandular activity. This characteristic of the sponge is invaluable to the physician. Glands so much enlarged as to be mistaken for polypi have been thus destroyed. The dilatation is useful too in application to the cervix of *Iodine*, *Carbolic acid* in strong solution, or even *Nitric acid* in obstinate cases. The latter must be used with caution, lest, approaching too near the internal os, a contraction be produced. Care should be taken to thoroughly cleanse the canal from all mucus, using a cotton-wrapped probe for the purpose. In applying the acid I use a carefully cut wooden tooth-pick or a smooth, small ivory knitting-needle. These smooth surfaces retain but little acid, so there is small danger of deep cauterization.

For the *Iodine* a fine camel's-hair brush is best for use near the external os, but in order to reach far in, the former instrument is suitable. After the application irrigate with tepid water, apply glycerine tampon, and have the patient stay in bed. The tampon should remain *in situ* for twenty-four hours; for a week following, a hot douche of carbolized water should be taken twice a day, and then, if the "patches" are not destroyed, the process must be repeated. The internal medication must be suggested by the general condition of the patient.

Therapeutics.—**Alumina** is indicated in glandular endocervicitis when the discharge is glairy, acrid, very profuse, running out in streams, increased by the use of tepid injections, relieved by cold water. The patient suffers from constipation, and straining at stool increases the discharge.

Calcarea carb.—For fair-haired, fat women who have profuse leucorrhœa, which passes while urinating; the cervix has a doughy feeling; no breaking of the skin.

Graphites is useful in the endocervicitis which is accompanied with skin troubles. The patient has rhagades on the thumbs, and wherever the leucorrhœa touches it causes cracks in the skin.

Kali iodatum is indicated if the patient has swollen glands in neck or axilla; the discharge is yellow, and comes away in strings.

Consult also *Sulphur*, *Sepia*, *Conium*.

For the third variety, cystic degeneration, medicine seems useless, and the surgeon's knife must lend its aid. The mucous polypi must be removed; the glandulæ Nabothi must be laid open and the cavities washed out or else removed entirely. The cervical canal must be dilated and scraped with a dull curette, so that all growths may be removed; after so doing, the denuded surface should be brushed over with carbolic acid. Sometimes amputation of a portion of the cervix may be necessary.

ACUTE METRITIS.

BY JULIA HOLMES SMITH, M.D.

Synonyms.—Congestive hypertrophy, Inflammation of the womb, Progressive inflammation of the connective tissue of the uterus.

Definition.—Progressive inflammation of the connective tissue of the uterus, characterized by rise in temperature, quickening of the pulse, severe pain in the pelvis, with tenderness of the hypogastrium on pressure.

Varieties.—Puerperal and non-puerperal metritis.

Ætiology.—Acute metritis is ordinarily caused by accident at childbirth. The long-continued pressure of the child's head in one spot, due to malposition or too long delay in using forceps, may cause a bruise of the soft tissues which leads to metritis. The unskilful use of the forceps, even the slipping of a blade, may produce a wound which, poisoned by the lochia, is quite enough under favorable conditions to induce serious local and constitutional disturbance. Laceration of the uterine cervix is another factor in the ætiology of metritis, although many lacerations undoubtedly occur which are not followed by so grave a result. When from any cause the lochial discharge becomes irritating, either from partial retention or systemic disturbance, its contact with abrasions of any kind is very deleterious, and the gaping wound of a lacerated cervix is surely much exposed to the action of the poison. Metritis may result from the extension of an endometritis induced by retained membrane or particles of placental débris. The inflammation, beginning inside the uterus, extends rapidly outwards through muscular and connective-tissue substance. Catching cold during confinement is another very frequent cause, puerperal hyperæmia passing readily into inflammation. A severe nervous shock from grief or anger has resulted in an acute metritis in a lying-in woman, the metritis in this instance being preceded by marked constitutional disturbance.

Outside the puerperium, acute metritis is of less frequent occurrence and results from varied causes.

1. Exposure to cold during menstruation. 2. Careless manipulation of the sound, whereby the endometrium is wounded and a focus of inflammation created. 3. The careless use of intra-uterine pessaries and sponge-tents. 4. The action of gonorrhœal virus, setting up an endometritis, not unfrequently results in an inflammation of the body. 5. Excessive or forcible coition, producing injury to the tissues of the neck. 6. The use of cold injections immediately after coition to prevent conception. 7. The induction of abortion by the employment of various instruments.

Pathology.—The uterus is enlarged and soft. There is an infiltration of the tissues with serous fluid, and a soft, flabby condition of its fibre, with greatly increased vascularity. The most frequent seat of this change in the puerperal woman is that part of the organ to which the *placenta* was attached, or else near the neck, where probably the presenting part of the fœtus lay long superimposed. The veins are engorged, and puerperal metritis is sometimes complicated with uterine phlebitis, the veins and lymphatics taking up the impure matter, thus causing abscesses in other parts of the body. In metritis the uterine cavity is not enlarged, but its lining membrane is thickened. The formation of pus in the tissues of the womb is not unfrequent, especially if the patient be predisposed to the "*diathese de suppuration*" of Trousseau. Distinct abscesses are formed* "from one to five inches in diameter, or else the pus is infiltrated into the fleshy fibres, imparting to them a reddish-yellow color, perceptible through the peritoneum." In malignant and fatal cases the whole tissue becomes gangrenous.

Coagulable lymph is effused in some instances, particularly when the serous membrane is involved in the inflammatory process, and in the process of repair adhesions are formed with the surrounding parts.

Symptomatology.—In the puerperal variety metritis occurs soon after delivery, especially if a cold was taken just before labor commenced. The patient complains of rigors, and there is a sudden rise in temperature, proportioned to the gravity of the attack and the area of inflammation. The after-pains are aggravated; there is bearing-down and a feeling of weight, with burning in the vagina and vesical tenesmus, the scanty urine scalding as it flows. The slightest motion, as coughing or sneezing, sends pains shooting down the thighs. Diarrhœa is not uncommon, but constipation is the rule at first. In cases threatening dissolution the stools are passed in bed unconsciously. The pulse is quick, full, hard, often ranging from 130 to 150. Nausea is a common symptom, as also headache with photophobia, and sometimes diminution of sight. "Faintness on rising in bed" is a symptom emphasized by Guernsey. Palpation reveals the uterus enlarged, flabby, and exceedingly sensitive on pressure. The vagina is hot and dry at first; later there may be discharges characteristic of the progress of the disease. In puerperal metritis the lochia are suppressed; in the non-puerperal variety amenorrhœa is of frequent occurrence. The patient is restless, dreads death, and is consumed with a thirst which often seems only aggravated by water. The pain is often aggravated by cold, while in other cases the burning, lancinating distress, especially in the left ovarian region, is soothed by the application of an ice-bag.

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* See Boivin and Dugès.

If pus be forming, there are present the characteristic rigors and localized pain and tenderness. The abscesses usually discharge into the rectum or vagina, or else the pus burrows, forming a sinus, and finds its way to the surface in the iliac region, or, as sometimes happens, it is discharged into the peritoneal cavity, and sudden death ensues.

Diagnosis.—The subjective symptoms and physical signs must be considered together. The latter are the enlargement and soft, doughy feeling of the uterus, great vaginal heat and dryness, and usually extreme tenderness from pressure on the hypogastrium. It may be diagnosticated from general peritonitis by the absence of tympanitis, the mobility of the organ, the more circumscribed area of pain and tenderness, and the less severe character of the constitutional symptoms. But it is almost impossible to tell whether there is not an involvement of endometrium and perimetrium or to determine in which of the three tissues the inflammation is greatest. That it begins, as a rule, within the uterine cavity, which is most liable to injury and exposure, there is very little doubt. The pain may be a dull aching, extending over the whole abdomen, or a burning, lancinating, torturing sensation which is aggravated by motion or pressure even of the bedclothes or the jar of the bed when one walks in the room.

According to Dr. Thomas, a differentiation may be made between metritis and cellulitis; the latter is known "by a phlegmonous, tender mass in one broad ligament or near the uterus." From phlebitis the differentiation is not difficult, since in this malady the pus is found burrowing near, and discoloring, the joints.

Prognosis.—In metritis the prognosis must be guarded, for while under wise homœopathic treatment many cases run a rapid course and result in entire recovery, the inflammation terminating in speedy resolution and the exudation of lymph being promptly absorbed, it must not be forgotten that the tendency of metritis is to become chronic, and that the exudation of lymph may result in adhesions which, in some cases, tie down the fimbriæ of the tubes, and so cause sterility or even extra-uterine pregnancy, the fimbriæ not being able to catch the ovum when it leaves the ovary. Neither must there be overlooked the possibility of the formation of pus and abscesses with the subsequent great drain upon the system. Fatal cases often succumb in a few days to the violence of the fever, or death may eventually take place from the absorption of poisonous matter into the system, or from marasmus due to a long-continued process of suppuration.

Treatment.—A most important point is absolute rest in a horizontal position. Irrigation of the vagina several times a day with hot water, each douche lasting half an hour, is very serviceable. I have used with great success a persistent flow of hot water against the cervix, by this means promptly aborting an incipient inflammation. If the metritis depends upon the presence in the uterine cavity of parturient débris or retained lochia, an intra-uterine injection must be used of a solution of Carbolic acid, or Thymol, or Salicylic acid, using a Molesworth syringe. Hot poultices of bran, fomentations of alternate hot and cold water, a turpentine stupe over the abdomen, are all valuable adjuncts in allaying the pain. Great care must be taken that the rectum does not become overloaded, since such a condition, with a distended colon, very much aggravates the pain.

In the non-puerperal variety the treatment is similar, except that the intra-uterine injection is not allowable.

Therapeutics.—**Aconite.**—Hard, rapid pulse, high temperature, dry skin; the patient is very restless, and dreads death.

Arsenicum.—Pain is worse from the least cold, even motion in bed makes her feel as if swept from head to foot by a breeze. Drinks often, but a little at a time; dry skin; quick and light pulse; pinched look about the face; typhoid symptoms.

Bryonia.—Milk is suppressed; all her pains are worse from motion; the patient complains that the abdomen feels as if it were torn asunder; characteristic thirst and gastric symptoms.

Mercurius is a very useful remedy when indicated by constitutional symptoms; there are exacerbations at night, copious sweating without affording relief, and frequent rigors.

Cantharides is of value when the urine is scanty; the patient complains of cutting pain in the bladder, and the vesical tenesmus is tormenting.

Colocynthis.—Full pulse; the pain is of such a character that the patient lies on her back, with her knees drawn up over the abdomen; often she complains of sticking pain; characteristic diarrhœa.

Rhus.—Great restlessness, seeking relief in change of place; dry tongue with a dark line in the middle. The limbs feel heavy and are only easy when they are rubbed.

The following remedies should be consulted: Platina, Pulsatilla, Hepar sulph., Lachesis, Sulphur, and Stramonium.

Chronic Metritis.

BY JULIA HOLMES SMITH, M.D.

Synonyms.—Chronic parenchymatous inflammation, Chronic inflammation of the uterus, Areolar hyperplasia, Infarction, Diffuse proliferation of connective tissue of the uterus, Diffuse interstitial metritis, Vascular dilatation or hyperæmia of the uterus.

Definition.—The multiplicity of names for this disease suggests the difficulty both of exact diagnosis and of definition. It may be described as an enlargement of the uterus due to the development of connective tissue, the product of excessive cell-formation, consequent either upon subinvolution of the organ—in which case the muscular cells which have suffered fatty degeneration are replaced by cells of connective tissue type—or to prolonged hyperæmia resulting from disturbance of circulation.

Ætiology.—The causes are constitutional or predisposing, and active or exciting. The former consist of influences which, by their persistent depressing effect, render the system less responsive to physiological changes and more sensitive to pathological conditions. Here belong the tubercular and scrofulous diathesis, and conditions which, like neurasthenia, are characterized by perverted action of the vasomotor system.

Among the exciting causes may be enumerated parturition too often recurring; subinvolution of the uterus; laceration of the cervix or perinæum; the retention of portions of the placenta or membranes; unskilful use of forceps, causing an abrasion which, poisoned by the lochial discharge, becomes a focus of chronic inflammation. In a so-called "dry delivery" the pressure of the child's head upon the soft parts of the mother is often a factor in metritis. Lactation is a cause of chronic metritis which should not be overlooked, because it is a cause of subinvolution. The relation between the mammæ and the uterus is so intimate that the failure on the part of a mother to avail herself of the aid of lactation in promoting involution is unwise and, save for grave cause, should never be allowed by the physician.

Displacements of the uterus, as well as flexions, serve to induce chronic metritis by the interference of such conditions with normal circulation. The presence of tumors in the uterine cavity or in its walls, the extension of disturbed nutrition due to the presence of ovarian tumors, and, according to some authors, chronic constipation may be important factors. Extension of an endometritis into the parenchyma is a very frequent cause, and if the inflammation has been gonorrhœal, such extension is inevitable. Again, metritis may be a sequence of perimetritis, the uterine walls having been invaded from without. The prolongation of normally hyperæmic conditions may cause chronic uterine inflammation, such as exposure to cold during menstruation, masturbation, excessive coition, or unsatisfied sexual desire. Emmet* refers many cases of chronic metritis to the use of "the condom or any other means which keeps the semen from the vagina, since its presence is the natural stimulus for relieving the congestion of the female organs of generation." He also claims to have seen cases of congestive hypertrophy of the uterus due to *malaria*, a statement very readily verified.

Pathology.—Chronic metritis or hyperplasia of the uterus has been the subject of much investigation by French and German pathologists, and the preponderance of authorities is against the theory of inflammatory action as a part of the process. Grafted, usually, upon a uterus which has been distended by pregnancy, the very first step in the abnormal process which results in hyperplasia is an excess in development. The number of round and oval globules, with amorphous tissue in the uterine walls, is increased, and the fatty degeneration and absorption of the excess, which should take place after delivery, is arrested. At first there is blood-stasis and congestion, and the uterus looks red. Later the organ becomes hard, and the parenchyma "creaks under the knife." Scanzoni says that chronic metritis would be, "in an anatomical point of view, a hypertrophy of the cellular tissue."* This hypertrophy is uniform, unless there be flexion, when necessarily the excess will be in that part in which there is the greater blood-supply. Thomas claims that there is only an insignificant increase in the amount of muscular fibre, while the proliferation of areolar tissue is always the predominant feature of this pathological condition of the uterus. This view is sustained by Klob, who says: "The uterine tissue sometimes proliferates, either without accompanying increase of the muscular substance, or, if this does occur, the connective tissue predominates to such an extent that the muscular substance is comparatively of not much account." Some authors, again, claim that the amount of muscular fibre is *actually diminished*, and, truly, in the early stages the marked softness of the parenchyma would suggest disproportion between the two kinds of tissue, and the attendant symptoms, menorrhagia and leucorrhœa, suggest a deficiency in muscular force.

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* Diseases of Women, p. 83.

This enlargement has been compared to hypertrophy of the heart, and it is to be remembered that with increase in the walls there is also increase in the size of the cavity, and the mucous membrane may be found softened, covered with villi, or ecchymosed from the ruptured venous capillaries, or, again, and very rarely, anæmic, comparatively dry, and adherent to the connective tissue beneath. The veins in some parts are distended, forming sacks or pockets; in others, by the crowding due to the hypergenesis of connective tissue, they are nearly obliterated. The hyperplasia may be confined to the neck, or it may involve the whole organ. In either case the weight is sufficiently increased to cause traction on the ligaments and ovarian disturbance, sometimes displacement.

Symptomatology.—Symptoms generally date from confinement. The woman gets up with a backache, weight in the pelvis, a "bearing-down" feeling, and the lochial discharge continues as leucorrhœa, varying in amount in proportion to the severity of the endometritis. There is often no aggravation from, but there may be an apparent abatement of these symptoms until, the return of menstruation. Then, with the renewal of the monthly hyperæmia and the loss, usually, of too much blood, local disorders increase and constitutional disturbances ensue. The latter, as a rule, are very serious. Digestion becomes greatly impaired; there is headache, languor, nervousness in its various forms, inability to endure even moderate exercise without much fatigue. Dull, heavy, pelvic pain becomes constant, frequently accompanied by tenesmus of the bladder and rectum; there is pain on coition, pain in the mammæ before menstruation, and sometimes nausea and vomiting as in pregnancy. In the non-puerperal variety the conditions are very similar, and the totality of symptoms about the same. Emmet believes that congestive hypertrophy in an unmarried woman exists "as a protest on the part of nature, the true function of the uterus never having been fully called into play;" sterility is accompanied by the same condition.

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* Diseases of Females, p. 181.

Diagnosis.—The uterus, by double touch, in the first stage will be found enlarged, soft, and flabby; in the second stage it is large, hard, and firm. It may be retroverted or retroflexed, but is not unfrequently normal as to curvature, though, as a rule, from the increased weight, lower than it should be. These physical signs, in addition to leucorrhœa and menstrual abnormalities, establish the diagnosis.

A careful differentiation must be made from early pregnancy. An error is easily committed, because of the enlargement, tenderness, and frequent darkening of the areolæ around the nipples, nausea, nervous symptoms, etc. In metritis, however, the patient menstruates, there is tenderness of the fundus, and leucorrhœa.

It is often exceedingly difficult to decide whether the existing enlargement be due to metritis or to the presence of submucous or intramural growths, as the latter may be so symmetrical as to be readily overlooked. The history of menorrhagia is, also, often the same. The conclusion may be arrived at by repeated, careful, conjoined manipulation, the use of the sound and curette, with microscopic examination of the scrapings. To differentiate between the stage of induration of metritis and of scirrhus, the history of the case should be a valuable aid, and the presence or absence of the cancerous cachexia will determine the diagnosis. Thomas mentions a test which originated with Speigelberg, viz.: In cancer, dilatation by a sponge-tent leaves the tissue hard and dense, while in cervical sclerosis it softens it. Ludlam claims that the use of the glycerine tampon will aid in differentiating between a cancerous and a simple metritic enlargement of the womb. In the former case, there will be no diminution in the size of the cervix from the use of the tampon; in the latter, the result of the depletion will be marked.

Prognosis.—The prognosis is unfavorable so far as complete recovery is concerned; it is favorable in regard to the point of comfort, if the patient is willing to give herself the best of care. Imprudent exercise, especially at the time of menstruation, abortions or labors, too frequent sexual indulgence, bring about relapses and exacerbations discouraging to physician and patient. But, as much improvement may be hoped for after the menopause, when atrophy of the uterus may occur, there is every inducement to abide by regulations necessary to modify symptoms and to secure as much comfort as possible up to that time. Scanzoni says: "The only case in which a favorable termination is possible will be when, after a pregnancy, the already organized effusion shall undergo an absorption resembling that observed in all the elements of this organ during puerperal involution."

Treatment.—This should consist of all possible means to reduce and prevent congestion. If there is laceration of the cervix, with the usual amount of glandular changes, treatment should at once be directed toward them. Scarifications for depletory purposes and for the evacuation of ovula Nabothi must precede, and prepare for, the operation of hystero-trachelorrhaphy. This scarification may be repeated twice a week during the inter-menstrual period, about an ounce of blood being withdrawn each time. If there is much cervical catarrh, a small-bladed knife, drawn across the mucous membrane from the internal to the external os, causes greater and more beneficial depletion than when the external vaginal portion alone is punctured.

Glycerine tampons should follow the scarification, and in a month or six weeks the tissue will generally be in proper condition for operation. After this, if there are signs of corporeal endometritis, the whole cavity may be gently curetted and touched with carbolic acid or iodine.

Displacements must be rectified by well-fitting pessaries, the uterus being lifted even a little higher than normal, to relieve the weight and consequent venous congestion.

Hot vaginal injections, used at night in a recumbent position, are of great value if well tolerated, and at least one gallon of water should be ordered. Careful attention should be paid to the general health. A certain amount of actual rest on the bed must be enforced daily, and moderate walks and rides in the fresh air are desirable.

At the menstrual period, especially if the flow is profuse, absolute rest in bed should be enforced and remedies administered to limit the discharge.

The diet must be simple and nutritious, and the bowels well regulated, as constipation causes pelvic congestion and does much harm.

By thus keeping the general system in the best possible condition and removing many of the local causes of irritation, so great an improvement is made that no serious discomfort is experienced from the hyperplasia itself. Treatment of an alterative nature should be continued however, as applications of iodine to the cavity and vaginal portion, often slowly, but surely, tending toward a reduction of hyperplastic tissue. Blistering the cervix for the depletory effect is sometimes recommended. Thomas uses vesicating collodion for this purpose, in which practice he is followed by Goodell. Applied through a cylindrical speculum, freely *painted* over the cervix, it is exposed to the air a few moments, a stream of cold water then thrown upon the neck, after which a glycerine tampon is inserted. In eight or ten hours a free flow of serum begins to pour forth, when the plug is removed and warm vaginal injections must be taken to prevent irritation of vagina and urethra from contact with the blistering fluid. Still more extreme measures may be needed when the cervix is so enlarged as to cause hyperæsthesia, thus becoming the source of actual pain. A small portion of its lower surface may be removed, either by the scissors or the galvano-cautery. Such an operation is often followed by a reduction in the size of the whole organ, but should not be undertaken without careful consideration.

Therapeutics.—The remedy should be selected with care; often a seemingly insignificant symptom will practically determine the choice of the remedy.

Calcarea carb., when there is a creamy discharge, with aching in the vagina, and itching of the vulva.

Kali bichromicum is indicated when the leucorrhœa is yellow and ropy, the menses recur too soon, and the patient complains of pain in the back.

Conium.—The uterine tissues are indurated, the pain is dull and heavy, and very frequently mastodynia is an accompanying symptom.

Sepia is suitable for sulky, dark-skinned women who complain of dull backache, a bearing-down feeling, and copious watery leucorrhœa. It is well to use Nux vomica with Sepia as an intercurrent remedy, giving a dose of Nux vomica once a week.

Iodine is called for when induration is a prominent symptom, especially about the uterine neck. It is to be given internally in potentized form and applied in tincture to the cervix with a camel's-hair brush.

Secale, because of its known power to cause uterine contractions, is very helpful in chronic endometritis. A large, flabby condition of the womb is a special characteristic for Secale.

When giving Secale internally, it is well to use the Ergotin hypodermically if there be concomitant menorrhagia. Ten minims of the Liquor ergotin daily will do much to stop persistent menorrhagia and to reduce the size of the womb.

Belladonna is indicated when there are reflex disturbances, such as headache, with photophobia and dimness of vision.

Ipecacuanha.—If there is nausea, the symptoms simulate pregnancy, and there is a craving for sweet things.

Cimicifuga, *Senecio*, *Apis*, *Pulsatilla* may be studied to advantage.

ACUTE ENDOMETRITIS.

BY JULIA HOLMES SMITH, M.D.

Synonyms.—Acute uterine catarrh, Internal metritis.

Definition.—Inflammation of the lining mucous membrane of the uterus, with very copious discharge.

Ætiology.—Acute endometritis in the non-puerperal woman is caused by exposure to cold or by suppression of menstruation; it also frequently arises from an extension of gonorrhœal inflammation, and often accompanies the exanthems. Endometritis may result from the rough use of the sound, whereby the delicate membrane is wounded and traumatic inflammation produced; the wearing of an ill-fitting stem-pessary may lead to the same result. In the puerperal state inflammation may be due to a retention of some of the incidental débris, or to the forcible and unskilful removal of the placenta, in which case it is apt to advance rapidly to metritis.

Pathology.—The mucous membrane of the uterus in its normal condition is made up of an intercellular substance which rests on the muscular tissue; interwoven with this intercellular substance is a connective tissue reticulum made up of spindle-shaped cells. It is to be remembered that this mucosa is rich in glands, and that the whole is freely supplied with bloodvessels. The lymphatic glands everywhere in the body are constantly secreting the fluid so essential to growth and repair. The mucous membrane of the uterus is no exception to the rule, and many cases of so-called catarrhal inflammation, lacking the febrile element altogether, may be regarded simply as instances of hypersecretion. This hypersecretion, if hindered from escaping by an abnormally narrow os, or by distortion of the uterus, becomes itself a factor in the ætiology, and causes a sort of maceration or degeneration of the mucosa. When, however, actual febrile conditions exist, the membrane is found hot, dry, and hyperæmic; later, a discharge appears, which at first is watery, then albuminous; at a later stage of the disease there ensues a degeneration of the cellular tissue, and the imperfect cells give a creamy appearance to the fluid. In the more serious cases the discharge is laden with pus and blood, because the connective tissue has suppurated, and the walls of the capillaries have broken down. If the endometritis begin at the site of the placenta, the glands are dilated and, possibly because of their habit of hypersecretion during pregnancy, the discharge is much more profuse, and contains abortive formations of cell tissues. The pathological changes due to gonorrhœal poison are similar to those wrought in other parts of the genital tract.

Symptomatology.—In acute endometritis the disease is usually ushered in with a chill, then a rapid increase of temperature, with quick, wiry pulse. The breath is feverish, the tongue white and pasty. The patient complains of pain in the back, loins, and pelvis, and the vesical tenesmus is torturing. At the beginning of the attack the bowels are usually constipated, but a diarrhœa soon supervenes. The abdomen is very tender on pressure, and the external genitals are at first dry, and the sufferer complains of a burning inside.

In forty-eight hours this condition changes for one of profuse discharge, the character of which differs as the degeneration of the mucosa progresses.

Diagnosis.—The diagnosis should be made from the subjective symptoms, and save in the puerperal state, when it is essential to ascertain if placental débris or decomposing clots are not the cause of the inflammation, the "touch" should be avoided, for it is exquisitely painful to the patient; for the same reason a speculum should not be used unless absolutely necessary.

The differentiation from hysteralgia is readily made, for, while in both the pain and restlessness are similar, the latter is not characterized by fever. or discharge. The absence of that general swelling of the uterus, peculiar to inflammation of the parenchyma, is absent in endometritis.

Prognosis.—In the non-puerperal state the prognosis is favorable under homœopathic medication, and even in the puerperal state the case is far from hopeless, although there are possible complications which make it the part of wisdom to give a guarded opinion.

Treatment.—Throughout the duration of the disease absolute rest in bed should be enjoined; fomentations or poultices over the uterus, so long as tenderness lasts, are to be employed, and in some cases a turpentine stupe works wonders. As soon as the hot, dry vagina will admit the syringe, a douche should be given of a gallon of hot water or of the same quantity of a decoction of flaxseed or marshmallow; this is to be repeated three times daily. If the endometritis be a complication of the puerperal state, a disinfectant should be added to the injection.

Therapeutics.—**Aconite** is the first remedy suggested when the fever is high, the pulse wiry, and the patient exceedingly restless and discouraged.

Bryonia.—When the pain is increased by motion, the least jar of the bed hurts, the bowels are constipated, and the tongue is dry down the middle.

Mercurius is serviceable when the liver is torpid, the stools clay-colored, the abdomen bloated, and all the pain worse at night.

Arnica meets all indications when the origin of the inflammation is a wound from whatever cause in the endometrium.

Arsenicum is adapted to a low type of fever, with great restlessness and thirst, especially if the inflammation be brought about by septic influences.

Baptisia has served me well in an obstinate case of puerperal endometritis in which there were threatenings of typhoid.

CHRONIC ENDOMETRITIS.

BY JULIA HOLMES SMITH, M.D.

Synonyms.—Catarrh of the uterus, Chronic inflammation of the uterus, Blennorrhœa of the uterus.

Definition.—A chronic inflammatory condition of the lining membrane of the uterine body, with proliferation and discharge.

Ætiology.—Chronic endometritis is occasionally a sequence of an acute attack, or is the result of retained membranes after delivery, but more frequently arises independently of either. Tuberculous and scrofulous persons are frequent subjects of uterine catarrh, and abortions, subinvolutions, and the avoidance of nursing are all potent factors; flexions and displacements may cause congestion, blood stases and, of course, catarrh. Again, a narrow os, by preventing a free escape of menstrual blood, may cause endocervicitis, and by extension the endometrium of the body is invaded. Extension of vaginitis, simple or specific, injuries from the sound, tents, or pessaries, excessive sexual indulgence, or ungratified sexual desire, may cause endometritis.

Pathology.—The lining membrane is either reddened and covered with granulations, thickened, soft and velvety in its whole extent, or covered with a tissue similar to that which forms upon an exposed wound. In the first variety the glands are very much dilated and their secreting power greatly increased. The granulations appear as masses of glandular matter, and leucorrhœa is the prominent symptom. In the second case the whole mucous membrane is thickened, with increase of all its elements and marked cellular infiltration. The bloodvessels are greatly distended, but the glands are not much affected. In this form there is slight leucorrhœa, but very profuse hæmorrhage. In the third variety—which is described only by De Linetz—there is degeneration of elements of a purely inflammatory type, which accounts for the profuse muco-purulent discharge during life.

When endometritis is of long standing, the mucous membrane becomes finally completely atrophied, and is replaced by connective tissue. Destruction begins with the ciliated epithelium, then occurs in the cylindrical, which disappears and is replaced by the pavement variety. At last the glands either drop out or, being retained, become enlarged into cysts.

Symptomatology.—The indications of chronic endometritis are very varied. Leucorrhœa and hæmorrhage are the most prominent symptoms. The first is watery or gelatinous, with much less consistence than that from the cervix. Very often it is rust-colored from the admixture of blood, and by some authorities this is considered a pathognomonic sign, though not always present. A colored discharge should not be mistaken for the menstrual flow, and may be differentiated by the large amount of mucus. In some of the worst cases the discharge is perfetly purulent, in others milky. In old women who are long past the climacteric, there is a form of endometritis with subinvolution and so irritating a leucorrhœa that the most agonizing pruritus vulvæ results from it. Menorrhagia is the usual menstrual anomaly, and may be sufficient to cause great anæmia. Dysmenorrhœa does not exist, unless from some complication, as flexion or displacement or involvement of connective tissue. Sometimes the whole lining membrane is thrown off at each menstrual period, though the dysmenorrheal membrane, as it is called, is not held by many writers to be the product of chronic endometritis.

Pain in the back, or rather a sense of weakness and dull aching, is an almost constant symptom, and a pelvic weight and dragging suggestive of prolapsus. The patient often complains of a burning sensation across the hypogastrium. Nervous and digestive derangements are almost invariably present; there is also headache, especially over the left temple; the eyes are weak; palpitation of the heart results both from reflex uterine disturbance and from reflex dyspepsia. Tympanitis is very common, aggravated by the state of obstinate constipation generally existing. Thomas accounts for the last two conditions by the disorders of nerves governing peristalsis.

Sterility does not follow inevitably, but very frequently. It may result from the profuse discharge washing away the ovum or by preventing the entrance of spermatozoa through the thick tenacious plug that fills the cervical canal. Again, the unhealthy state of the endometrium may prevent the ovum from attaching itself, or if it lodge and begin development, nourishment may be so prevented as to cause early abortion.

Endometritis is sometimes accompanied with signs of pregnancy which may at first mislead. These are nausea, vomiting, tenderness of the breasts, even darkening of the areolæ, and though menorrhagia is the rule, scanty menstruation occasionally exists, making the case still more perplexing.

Varieties.—Chronic endometritis may be divided according to the pathological differences into, *first*, chronic endometritis with glandular hypertrophy. *Second*, that form in which the bloodvessels are dilated and engorged, or endometritis fungosa. *Third*, that in which there is produced an undifferentiated embryonic tissue.

Diagnosis.—In addition to the subjective symptoms, physical signs are to be carefully considered. Double touch shows the uterus to be considerably enlarged, the passage of the sound beyond the normal two and a half inches confirming this. There is not always tenderness, though this is the rule rather than the exception, especially at the fundus. Recognition of irregularities of the mucous membrane is of great importance, both as differentiating between the varieties of change there and the existence of intra-uterine growths. The sound being held lightly between thumb and finger, the slightest obstructive friction may be noticed. If any doubt exist as to the possible retention of parturient *débris*, the curette should be used. This mode of examination is also necessary to a positive differentiation between endometritis and commencing malignant diseases. In sarcoma the typical cells are round or spindle-shaped; in carcinoma there are abundant irregular epithelial cells with many nuclei.

Prognosis.—The prognosis depends upon the general health of the patient, the possibility of living in accordance with laws of hygiene, and the faithfulness of both physician and patient to a carefully selected line of treatment. Of all diseases of women chronic endometritis is most common, and of all not prejudicial to life it is the most difficult to cure. Many times the catarrh has extended to the tubes which by their persistent discharge of unhealthy matter become themselves an ætiological factor of considerable importance.

Treatment.—The successful management of chronic endometritis often taxes to the utmost the resources of the gynæcologist. Not the least valuable are hygienic measures. Nourishing food should be advised, and salt bathing, with friction over the abdomen, may be practiced to advantage. Gymnastic exercises strengthen the muscles of the abdominal wall, and a stream of water from a perforated disk held four feet above the body acts as a stimulant to the muscular tissue. When chlorosis, tuberculosis, or scrofulosis, or any other constitutional taint exist, Schuessler's tissue-remedies should be exhibited. If displacement is found, it should be remedied, and any tendency to constipation should be removed. Rest, with massage, is essential to a successful termination of an old case of chronic endometritis.

Concerning the methods of employing remedial agents much discussion has been had. Intra-uterine medication by means of injections is the quickest means of reaching the diseased surface, but it is always painful, and very often hazardous, to the patient. Some physicians report hundreds of cases in which the intra-uterine injection has been satisfactorily used; others find every case resulting in uterine colic. Instances are on record where the fluid penetrated the peritoneum through the Fallopian tubes, and death resulted. I have had no such untoward accident, and have frequently availed myself of Hale's formula for intra-uterine medication in endometritis.

℞.—Muriate hydrastis, ...	gr. v.
Glycerine, ...	℥ss.
Water, ...	℥iss.

Of this one-half drachm is given at a time, care being taken to have the temperature of the medicine correspond with that of the body. Iodized Phenol is very valuable as an intra-uterine injection in the mucosa fungosa.

Before using an intra-uterine medication, it is wise to dilate with a sponge-tent, unless the os be patulous. The tent is often really a curative agent in itself. By its pressure it destroys granulations just inside the cervix. Intra-uterine suppositories are often of use in the treatment of endometritis; these may be compounded of cacao-butter with *hydrastis*, or *thuja*, or *carbolic acid*, or boracic acid, or kali bichromicum, the latter more especially when the discharge is stringy. The cloth-tent, saturated with an appropriate remedy, is extolled by some, cous surface. Women who have dark hair and complexion, and who are of a bilious temperament, are more ready victims to this disease than are those of an opposite temperament.

Ætiology.—The great predisposing cause of uterine cancer is an inherited diathesis, but there are undoubtedly cases and conditions in which the disease may be acquired. In case of heredity it very commonly follows mammary cancer, or, in other words, if the mother has had a true cancer of the breast, her daughter, if she ever has cancer, will be likely to have it in the womb.

Other determining causes are advancing age, frequent abortions, especially if they have been mechanically induced, rapid child-bearing, sexual excesses, criminal use of means to prevent conception, and chronic menstrual irregularities. Since those who have not borne children and who have never been in labor, either prematurely or at term, are generally exempt from cancer of the uterine cervix, we may refer many cases of epithelial cancer of the neck of the womb to a laceration of its tissues. This is an acquired, and possibly a preventable, form of the disease.

Symptomatology.—The symptoms are deceptive, and the suffering is disproportionate with the gravity of the disease. In a large share of cases the lesion will have made fearful inroads before any particular pain is felt. It is only when the peri-uterine tissues are the seat of infiltration or of inflammation, or when the organ has become so enlarged as to press upon the pelvic nerves and vessels, that severe or frequent pain is complained of. If the mucous membrane has been attacked, the pain is usually described as of a burning character, while if a growth is contained in utero, the peristaltic action of the womb is excited and labor-like efforts are the result. The most common form of pain, however, is neuralgic, and the suffering is located in the lumbar, sacral, and iliac regions. With the intra-pelvic deposit in old cases comes pressure upon the sacral nerves and an extension of the pain along the course of the sciatic nerve to the lower extremity on either side, and a similar cause applied to the veins induces œdema of the legs and the feet. If the infiltration has taken place around the abdominal cervix, as in pelvic peritonitis, the uterus will not only be firmly anchored, but the pain will be of such a kind as to be aggravated by motion, by a change in the position of the body, and by defecation or urination.

Perhaps the most constant of all the symptoms is the hæmorrhage, and yet it is not present in every case. In the early stages of the disease it is menorrhagic, but later the discharge is more copious and long-continued, and recurs without regard to the monthly period. Usually the nearer the approach to the climacteric, the greater the amount of blood lost by the repeated hæmorrhages which, when the interval is prolonged, are sometimes mistaken for a continuance of for remedies for endometritis. I shall only point out a very few which have served me well.

Therapeutics.—**Trillium.**—When the discharge is rust-colored.

Sepia.—For dark-skinned women with offensive leucorrhœa.

Arsenicum iodatum.—Thin, watery, bad-smelling discharge; the patient is liable to have sores.

Sulphur.—Chronic endometritis in scrofulous patients; the discharge is excessive and comes in gushes.

Silicea, Pulsatilla, Phytolacca, Aurum are to be carefully considered in cases of this kind.

UTERINE CANCER.

BY R. LUDLAM, M.D.

Excepting cancer of the mammary gland, this form of carcinoma is more frequently met with than any other in the case of women. It has been estimated that one-fourth of the women who survive the climacteric ultimately die of this disease in one or another of its forms.

Varieties.—For practical purposes we recognize three forms of this disease: (1) the fibrous or scirrhous; (2) the medullary or encephaloid; (3) the epithelial or the cancroid form. The first, or the scirrhous variety, is known among authors as the chronic form of the disease, and one in which the uterine tissue becomes hard, of a white or grayish-white color, with such an absence of moisture as causes it to creak when it is cut with the scalpel. In the encephaloid cancer the surface is of a pinkish-white or rose color, with a caseous consistence like that of the cerebral mass. The epithelial form is fungous or vegetating, with a tendency to ulceration.

Most authors treat of two general varieties of uterine cancer, *viz.*, that of the body of the organ and that of the cervix, but the tissue division is the better one.

Clinical History.—Uterine cancer is comparatively rare in young women, being most frequent after middle life, and at or after the menopause. It is almost always idiopathic, but it sometimes follows the same lesion of the ovaries, the mesentery, or the mammary glands. Like other forms of cancer, it is insidious in its approach, the patient being often the last to believe that she is affected by it. In some women, however, there is such a dread of it as to develop a train of nervous symptoms which have been classed under the head of *carcinophobia*. This disease has another clinical peculiarity, which is that it seldom attacks those who have been ill in a chronic way, or bed-ridden with other affections of the uterus and other pelvic organs. Excepting in the scirrhous variety, which is comparatively rare, the progress of the disease is usually rapid, more especially if it begins on the mucous surface. Women who have dark hair and complexion, and who are of a bilious temperament, are more ready victims to this disease than are those of an opposite temperament.

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In advanced cases the hæmorrhage is caused or increased by the slightest movement, by local irritation, as from the contact of the finger, the use of syringe, coitus, coughing, or by straining at stool; by the most careful introduction of the speculum or the sound, by lying upon one hip or the other, by standing or stooping; or by mental excitement. The quality of the blood that is lost depends upon the excess of the hæmorrhage and the duration of the disease. As the cancerous cachexia is more fully developed, it becomes thin, mixed with a sanious pus, and with the débris of the uterine tissues.

The scirrhous form of uterine cancer is the only one that is not accompanied by a more or less constant and characteristic leucorrhœal flow. This discharge is thin, watery, offensive, and sometimes corrosive in its character. More often it resembles bloody water, and leaves a peculiar stain upon the finger after applying the "touch." In the epithelial forms of cancer of the cervix uteri this watery discharge is sometimes very copious, as it may also be from the presence of a polypus or of a submucous fibroid. When the discharge is very acrid, it may induce a painful vaginitis or a vulvo-vaginitis, with pruritus.

When the deeper tissues are involved and the destructive changes go on rapidly, the discharge becomes thicker and more fetid, changes its color to a greenish, dirty-yellow, brownish, or chocolate hue. If the ulceration has extended to the rectum or to the bladder, fæces or urine will be mixed with the flow. In cauliflower excrescence the granulations are so friable that they will be mixed with the discharge.

The objective signs should be carefully elicited. The touch and the speculum are the main reliance. The sound should not be employed. The irregularities of the cervical surface and of the os uteri, the great tenderness of the parts, their proneness to bleed at the slightest touch, and the appearance of the finger as well as the odor of it when it is withdrawn, are very significant. When the speculum can be used without causing much pain, or inducing such a discharge as to obstruct the view, the nature and extent of the lesion may be more thoroughly made out.

The constitutional involvement proceeds very slowly in some cases, and in others very rapidly. The rate at which the general health breaks down is somewhat in proportion with the phagedenic character of the ulceration, hæmorrhage, and the inanition of the patient. It is doubtful if the disease is ever perfectly localized in the uterine tissues; and therefore constitutional symptoms are almost always present, if we can only find them, whenever the characteristic lesions of uterine cancer are discoverable.

Diagnosis.—It is only in the first stage of the disease that the different varieties of uterine cancer are difficult of recognition. Fortunately, it is most frequently located in the vaginal portion of the cervix, which is readily accessible to physical exploration. If we are careful to remember and apply what has been said above of the hæmorrhage, the leucorrhœal flow, the character of the pain, and the constitutional symptoms, we shall not give a wrong diagnosis.

In cervical hyperplasia, or corporeal cervicitis, the use of the sponge-tent, according to Speigelberg, dilates the part and distinguishes the lesion from the fibrous or scirrhous cancer of the cervix, upon which it would fail to make an impression.

An intra-uterine fibroid might be attended with copious watery discharges that are offensive and bloody, but the sound and the bimanual manipulation would detect a tumor in utero. Moreover, the larger-sized fibroids and polypi are almost never attached to the uterine cervix.

The same rule applies to fibrous polypi, which, as a class, have a disposition to appear at the internal os uteri, and then to recede; which are not sensitive when a needle is thrust into them; which increase in size at the mouth; and which occasion expulsive pains like those of labor. There is, however, a condition of degeneration of these fibrous growths which is styled sarcomatous, in which, if the tumor sloughs away or is removed, it grows again. These are the recurrent fibroids which are believed to be cancerous in their nature. So that, while in general we may say that a woman who has a uterine fibroid is in no danger of dying from cancer, we should be careful to qualify our diagnosis and prognosis in the case of these sarcomatous polypi.

In very rare cases syphilitic ulceration may destroy the uterine cervix and eat its way through the rectal or the vesical septum, as the cancerous ulcer is prone to do. But the varying constitutional symptoms and the clinical history of the case will enable us to discriminate between them.

Prognosis.—There are no well-authenticated cures of uterine cancer. Sooner or later, it may be by septic infection, phlebitis, cellulitis, uræmia, or some other serious lesion, or by inanition and exhaustion, it will destroy life. Remissions in the symptoms are very deceptive, and the most determined course on the part of the patient and the physician is doomed to disappointment. If there is an exception to this rule, it is in the case of superficial epithelioma of the cervix.

Treatment.—The preventive treatment includes the proper hygienic care of such as are predisposed to this terrible disease, more particularly as to cleanliness, the avoidance of sexual excess and worry and of the use of local washes and injections of an irritating nature, a careful puerperal hygiene, and the proper treatment of uterine subinvolution and laceration.

The recognition of laceration of the cervix having practically put an end to the use of escharotics for the cure of a fancied ulceration of the womb, it is morally certain that cases of cervical cancer will be less frequent than they were a few years ago. If we add to this the good effect of closing the laceration by Emmet's operation, or some modification of it, in cases to which it is adapted, the prophylaxis of uterine cancer will have a still wider application.

The objects to be met by local treatment in advanced cases of uterine cancer are: (1) to relieve the intra-pelvic pain; (2) to control the hæmorrhage, and (3) to disinfect the discharges.

The best means of filling the first two of these indications is the resort to hot-water vaginal injections. In very bad cases, however, where the pain is chronic and insufferable, suppositories of opium or some other anodyne may be required. Iodoform, mixed with almond oil or with lard, one drachm to the ounce, may be applied by means of a cotton tampon; or a mixture of chloroform, glycerine, and sweet oil may be used in the same way. Occasionally we may take advantage of the anæsthetic properties of very cold applications, and Aran's expedient of passing a cylindrical speculum and filling it with broken ice, may relieve the pain more promptly and decidedly than anything else. Local anæsthesia by the ether-spray, or the use of the styptic colloid with which morphia has been mixed, may do best.

In some cases both the pain and the hæmorrhage may be controlled by the local employment of Hamamelis; and the use of styptic cotton is an expedient that is worth remembering in this connection. Rest, during menstruation especially, and sexual abstinence will often prevent severe paroxysms of pain and flooding, and care as to the kind and degree of exercise that is taken will have the same effect.

To overcome the fœtor of the discharges various means are in vogue, and we may need to try them all, acetic acid, lemon juice, carbolic acid, pyroligneous acid, the chloride of lime, the sulphite of soda, thymol, bromine, iodoform, the perchloride of iron, the chlorinate of soda, or a weak solution of the iodide of lead. Glycerine is an excellent antiseptic, and will readily mix with the most of these substances as a vehicle. It is very important to keep the parts clean, and for this purpose a little powdered alum, a few drops of creosote, or a weak solution of the chlorate of potassa may be put into the water with which the vagina is syringed. This precaution not only keeps the parts clean, but it prevents rê-infection from putrid absorption.

With or without these local measures of palliation and relief, we may resort to the use of internal remedies. Of these the most prominent are: Arsenicum, Nitric acid, Thuja, Hydrastis, Aurum met., Lachesis, Kreasotum, and Conium.

It is to be remembered, however, that the available and reliable clinical testimony of our school establishes little more than the probability that suspicious growths of the nature described, if brought to the attention of the physician in their earliest stage, may be retarded, and perhaps cured, by the internal administration of a well-indicated remedy, and that, on the other hand, the persevering use of the remedy corresponding to the totality of the symptoms presented by the case may also retard the growth and render more comfortable the condition of the patient. In view of the fact that these growths hardly ever attract the attention of the patient until well advanced, and that the medical man has no opportunity to thoroughly test the correctness of the claims made for the efficacy of internal treatment in very recent cases, it is evident that such claims are likely to remain mere assertions; and the direct share borne by internal medication in the relief afforded a patient suffering from malignant disease of the uterus cannot be determined so long as few, if any, physicians will have the temerity in the treatment of such cases to depend upon internal medication to the exclusion of all other means of relief. The importance of the subject, however, is such that no opportunity should be lost for applying any test that may throw light upon this very interesting question.

Arsenicum.—This remedy is chiefly indicated by the intensely-burning character of the pains experienced. The discharges, whether thick or thin, are corroding, burning, and usually very offensive. Among the concomitants, the characteristic thirst, restlessness, dryness of the skin, and expression of the countenance are particularly important.

Nitric acid.—Useful in women of a dark, bilious complexion, who lose much blood during their menstrual period, and suffer at that time with much pain in the back, hip, groins, accompanied with severe, painful bearing-down. There is a foul-smelling and corroding discharge from the vagina, stringy, tenacious; stitching pains in the vagina, shooting upward; violent pruritus. Evidence of syphilitic taint. (?)

Thuja.—Presumably of value in the presence of easily-bleeding, cauliflower excrescences, warts, etc., indicative of the syphilitic taint. Sharp, excruciating pains in the hips, thighs, and legs.

Hydrastis.—Useful chiefly on account of the correcting and soothing influence it exerts upon ulcerative processes involving the deeper as well as the superficial structures; scirrhous indurations of the cervix, with keen, darting pains like the thrust of a knife, with characteristic leucorrhœa, sinking and "goneness" at the epigastrium; constipation, etc.

Aurum met.—Extensive induration of the uterus, with severe cutting pains, very offensive discharge, and marked despondency.

Lachesis.—Tendency to passive hæmorrhages, alternating with profuse discharge of blood, coming on every few days; especially useful at the climacteric period. Sharp pains, resembling the thrust of a knife. Characteristic concomitants.

Kreasotum.—All the discharges are acrid, excoriating, accompanied with burning, soreness, and itching of the parts touched. Dragging pain in the back, extending from above downwards, relieved by stooping. Scirrhous indurations of the womb. The mouth of the womb stands wide open; great tenderness of the vagina.

Conium.—Is earnestly recommended by some writers in the treatment of scirrhous affections. Guernsey gives the following indications: "There are burning stitches, stinging, nausea, vomiting, and sadness. The breasts are relaxed, except at the menstrual period, when they often swell, and become sore and painful. The urine intermits in its flow. There is much vertigo, particularly on turning her head when lying in a prostrate position."

It is well to consult also, as possibly useful, the following remedies which may be suggested by the totality of symptoms: Iodum, Carbo animalis, Clematis, China, Graphites, Phosphorus, Phytolacca, Lycopodium, Silicea, Sepia, Mercurius.

Concerning the excision of cancerous growths, and the extirpation of the uterus, as a means of radical cure, but little need be said in this connection. The removal of papilloma and of cauliflower excrescences from the mucous surface of the cervix, or even from the cavity of the womb, are palliative and not curative. The amputation of the body and fundus of the uterus for cancer is a hazardous expedient and, at the best, gives only a temporary respite, for, if the patient recovers from the operation, the disease invariably returns. Complete hysterectomy is a fearful resource, and one which the experienced gynæcologist is very slow to adopt. The real objection to these operative measures is that the disease is not purely local, and that the lymphatics and the neighboring tissues are always more or less involved in the morbid process.*

Retro-uterine Hæmatocele.

BY R. LUDLAM, M.D.

This affection, for it is not a disease *per se*, has been described under the titles of pelvic, peri-uterine, and uterine, as well as of intra- and extra-peritoneal hæmatocele. Its essential feature is a sanguineous tumor, located within the pelvis. It is because this tumor is most frequently situated between the uterus and the rectum that the appellation given to it by Nélaton, viz., retro-uterine hæmatocele, is most appropriate. Of the thirty-seven cases reported by Voisin,† only one was ante-uterine.

Clinical History.—" Uterine hæmatocele is characterized anatomically by an intra-peritoneal tumor which is composed of blood, is encysted, and is situated in the lower pelvis, from which it projects into the abdomen." The extra-peritoneal variety is sometimes called the false, or pseudo-hæmatocele. It is non-encysted, depends upon the extravasation of blood into the pelvic cellular tissue somewhere, and is rarely met with except as a contingent of some form of pregnancy. We shall not treat of this latter variety.

The advent, the course, the complications, and the final result of an attack of hæmatocele will vary with the nature and the severity of the disease or of the vascular lesion upon which it is secondary. It will also be modified by the general constitution of the patient, the relapsing nature of the attack, the hæmorrhagic diathesis, and by the slowness or the rapidity with which the blood has escaped into the peritoneal cavity.

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* For the details of these operative procedures, see Ludlam's Diseases of Women, 5th ed., pages 705, 717.

† L'Hématocèle retro-utérine, etc., Paris, 1860.

Ætiology.—The predisposing causes of uterine hæmatocele are general and local plethora, the hæmorrhoidal and the hæmorrhagic diatheses, active sexual life and vigor, chloro-anæmia, vitiation of the blood from malignant disease, and menstrual irregularities, including dysmenorrhœa. To this list may now be added, especially since we are possessed of the observations of Virchow and of Bernutz,* the risks that are incident to pelvic peritonitis.

The exciting causes include various traumatic injuries, such as blows upon the abdomen, falls upon the buttocks, the effects of jumping and of being thrown from a carriage, and rough riding on horseback, especially when these shocks are applied during the menstrual epoch. Voisin reports several cases that were due to the indulgence of coitus during menstruation, and other writers have attributed it to a violent shock from fright during sexual intercourse. It may sometimes be caused by lifting, by straining at stool, by over-fatigue, intense mental emotions, or by too early exercise after an abortion. Nonas reports two cases in which it was caused by the use of cold injections during menstruation; and others have known it to arise from the application of cold sponges and compresses to the vulva during the monthly flow.

Madame Boivin † cites two cases in which it was due to a compression of the varicose veins of the leg by tight-fitting stockings. The treatment of hæmorrhoids by ligature, especially at the monthly period, has been followed by a similar accident.

A varicose condition of the ovarian veins may result in their easy rupture in consequence of these exciting causes. The utero-ovarian plexus is particularly liable to this contingency. In some cases the ovary itself is the seat of an apoplectic effusion and rupture; a condition which may be due to the failure of the Fallopian tube to grasp the ovum, or to a rupture of the Graafian follicle when the ovary is highly congested. The mere escape of the ovum into the peritoneal cavity, whether it was fecundated or not, could not, however, produce such serious consequences if the ovary and its vessels were not in a state of engorgement. When hæmatocele is the result of the detachment of the ovum in extra-uterine pregnancy, the bursting of the fœtal cyst or the separation of the placenta will account for the effusion of blood into Douglas's pouch.

Tubal distension and rupture, and the regurgitation of blood from the uterus into the peritoneal cavity induce the same consequences in a different way.

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* Archives de Tocologie des Maladies des Femmes, etc., for March, April, and May, 1880.

† Mémoire sur les hémorrhagies internes de l'utérus, Paris, 1819, p. 143.

The intra-peritoneal hæmorrhage has been ascribed by various authors as follows: by Bernutz, to menorrhagia with regurgitant flow through the oviduct; by Nélaton, to a rupture of the Graafian follicle and the gravitation of blood into the retro-uterine pouch; by Ferber, Virchow, and Bernutz, to the rupture of the newly-formed vessels in the false membranes resulting from local peritonitis (pachy-peritonitis); by Peuch, Bichat, and Devalz, to a rupture of the utero-ovarian plexus; by Tilt and Genouville, to the ovary itself; by Trousseau and Tardieu, to a sanguineous exhalation from the peritoneum; by Tyler Smith, to a vicarious Fallopian menstruation; and by Gallard, to the detachment of the ovum in extra-uterine pregnancy.

The accompanying table (see page 487) is taken from Dr. Marc Jousset's invaluable monograph on intra-peritoneal hæmatocele.*

Symptomatology.—In the development of a true hæmatocele there are three principal stages: (1) the discharge of blood into the peritoneal cavity; (2) the occurrence of peritonitis; (3) the encystment of the effused blood, or the formation of the tumor. The order in which these three stages occur varies in different cases, and tends to modify the symptoms accordingly. In the worst and most sudden attacks, where the rupture and discharge of blood are sudden and overwhelming, the hæmorrhage is the initiatory step, and the scene and suffering are, as Bernutz has so graphically styled it, dramatic. But where the disease has crept on insidiously, and the tumor has formed gradually, more especially when it is consecutive upon pelvic peritonitis, the symptoms are neither so alarming nor so dangerous.

In the former case the flow of blood may have been so copious as to fill every available portion of the pelvis and a considerable share of the abdomen also, causing the most atrocious pain by distension, and destroying life by collapse before the accumulation can possibly be encysted. In the latter, the extravasation is more gradual, and it follows the peritonitis which, in a sense at least, has either prepared a temporary compartment for its reception, or is ready to do so on short notice.

The pain is referred to the retro-uterine sacral regions, and to one or both sides of the abdomen along the iliac fossæ. It is described as very severe and unbearable, with pressure upon the rectum or the bladder, or both, and a feeling of bursting from distension. The sensation of pressure, as from a hard body like a stone, is quite common. The most violent peritoneal pains may even accompany a slight accumulation of blood, for the size of the tumor is no criterion of the suffering involved in its formation. In the subacute, or relapsing, variety, the tissues concerned may develop such a tolerance of the

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* Essai sur les Hématocèles Utèrines intra-peritonéales, par le Dr. M. Jousset, J. B. Bailliero et Fils, Paris, 1883, p. 89.

I. The formation of the hæmatic tumor has been preceded by symptoms of an internal hæmorrhage which has happened suddenly.	A. The symptoms begin in a condition of perfect health.	Rupture of the utero-ovarian plexus. " " " ovary. " " " Fallopian tube. Acute sanguineous exhalation.
	B. The symptoms occur in a woman who presents the signs of extra-uterine pregnancy.	Rupture of the plexus pampiniforme. " " " ovary. " " " oviduct. " " a fœtal cyst.
This is the *hæmatocele with a sudden onset.*	C. The symptoms happen during the course of menorrhagia.	Hæmorrhage from the tube. Utero-tubal hæmorrhage with reflux of blood.
II. The formation of the tumor has been preceded by symptoms of a longer or shorter duration.	A. Amenorrhœa with dysmenorrhœa, after which the tumor is formed by the distension of the uterus and the tubes with menstrual blood, then follows peritonitis, and finally hæmatocele.	Reflux of blood from its retention.
And this is the form of *hæmatocele with a gradual onset.*	B. Relapsing pelvi-peritonitis; symptoms of pelvic peritonitis for from two weeks to two months, then the sudden appearance in a few hours of the blood tumor.	Hæmorrhage from the vessels in the newly formed pseudo-membranes.

hæmatic tumor that the patient will not make any more complaint of it than she would of a retroverted uterus or of a pelvic abscess. When the attack is consecutive to peritonitis, the worst pain may have preceded the effusion, and the escape of blood from the ruptured vessels, or its exhalation from the neo-membranes, as in hæmorrhagic pleurisy, may bring relief while it increases the danger.

If the tumor is large enough to press the uterus directly forwards, there is an irresistible desire to urinate, which greatly increases the suffering through an ineffectual tenesmus of the bladder and by making it necessary for the patient to change her position very often. Through a direct mechanical pressure upon the rectum by the tumor, the bowels are obstinately constipated, and the fæcal accumulation adds to the suffering, while in chronic cases it increases the risk of blood-poisoning through fæcal absorption (copræmia). It is not unusual for this rectal pressure to develop a form of dysentery which it is quite impossible to cure, unless we know and can remove the cause of the mischief. In some cases the womb itself is the seat of a violent expulsive effort resembling labor-pains. Pressing against the cervix, or lifting it with the finger, often increases the pain.

The nausea and vomiting, the chill, the local pain of a sharp stabbing and lancinating character, the rapid pulse, and the pinched features of peritonitis are not often lacking. To these may be added, in bad cases, the pallor or the dirty slate hue of collapse, the look of anguish, fainting, hiccough, and an imperceptible pulse. If the pain and the peritonitis are marked, the temperature and the pulse will be increased; but if the hæmorrhage has been great and sudden, the temperature will be low and the pulse feeble.

Pelvic hæmatocele is so often related to menstrual disorders that the first symptoms are generally connected with amenorrhœa, menorrhagia, or dysmenorrhœa. If a copious menstrual flow is suddenly arrested, and a hæmatocele results, its onset will be very abrupt; but if the recurrent flow escapes very slowly, drop by drop, the tumor may develop gradually, and the general symptoms will come on imperceptibly. In the former case the sudden shock, as well as the loss of blood, may induce fainting and prostration. In both conditions, when the hæmatic tumor is formed, the external flow ceases.

The physical characters of the tumor, when it is large enough to extend above the pubis, or into the iliac region, are dulness on percussion, irregularity of outline, tenderness on pressure, partial or complete fixity, and elasticity with a sense of fluctuation which soon gives place to an unequal density (like the tumor of pelvic cellulitis). When this tumor rises above the superior strait it may either take the clover-leaf form, or be fashioned like the heart of a playing-card.

The signs per vaginam are the recognition of the base and inferior outline of the tumor; the dislocation of the cervix, forwards, backwards, or laterally, by the pressure of the foreign body; great tenderness on pressure in one or all of the culs-de-sac; and immobility of the tumor and of the uterus. The more prolonged the stage of fluctuation in the tumor, the greater the certainty that its outline is not limited by a cyst-wall, and the greater the probability that the effused blood is impoverished and lacking in fibrine. The conjoined manipulation and the rectal touch are very useful in detecting these hæmatomata.

Course and Duration.—In hæmatocele from rupture of the tubo-ovarian or other pelvic vessels, especially if it occurs in a woman who for several months has failed to menstruate, or if the tumor is too large to become encysted, the disease runs a more rapid course, sometimes ending fatally within a very few hours or days at the farthest. The more sudden the attack, and the greater the shock and collapse, the greater the danger, and the shorter the duration of the disease.

Where the trouble is due to menstrual retention and reflux, and the tumor is large enough to extend from the posterior cul-de-sac high up towards the umbilicus, the attack develops into one of general peritonitis. But if the effusion is not very large, and the case is curable,* "the symptoms of peritonitis subside, and from day to day there is considerable improvement. The pulse, however, remains frequent, and the features present the cachectic appearance that is proper to hæmorrhages. At the next monthly return all the symptoms may reappear, the expression and pains are as bad as they were before, the tumor increases decidedly, and death may follow, on account of the peritonitis having become diffused. At other times the blood cyst becomes the seat of a suppurative fever and internal inflammation, and, as in pelvi-peritonitis with suppuration, the abscess may open into the peritoneum, the rectum, the vagina, or the bladder. If it opens into the peritoneum, the case rapidly terminates in death; if into the vagina or the rectum, it results in a cure; if the opening is too small, or located too high in the intestine, or if it opens into the bladder, the disease will pass into a state of chronic suppuration with hectic fever. Among these different openings, therefore, the most favorable is that which communicates with the vagina. You have, however, seen one of our cases in which an opening into the rectum was followed by a prompt cure. These various terminations sometimes happen only after the third or fourth menstrual period.

"In the most fortunate of these cases the termination arrives through an absorption of the blood-cyst, and this retrogressive process also begins during the menstrual epoch, and has a very rapid course."

Velpeau reported a case in which the hæmatic tumor was not absorbed until eighteen months had passed, while of Voisin's twenty-five cases the longest period required was eight months. The elder

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* Jousset's Clinical Lectures, translated by Ludlam, p. 306.

Jousset cites a case of menstrual hæmatocele in which a tumor of this kind, as large as the adult head, had remained for two and a half years. The details of a very interesting case which was under the writer's care for two years, and in which the diagnosis was confirmed by an autopsy, will be found in the Transactions of the Clinical Society of the Hahnemann Hospital.*

Differential Diagnosis.—"If we consider the general symptoms exclusively, the purulent form of pelvi-peritonitis may be confounded with hæmatocele from retention, and adhesive pelvi-peritonitis with the menorrhagic hæmatocele.

"In hæmatocele from retention, as also in purulent pelvi-peritonitis, we find an abrupt invasion, with all the symptoms of peritonitis. This is very natural, for in both cases there is a violent inflammation of the serous membrane within the lower pelvis. However, there are three differences in the totality of the symptoms. The *first* is that hæmatocele, like a peritonitis which is due to a perforation, begins very abruptly; the *second* is that the hæmatocele occurs during the menstrual epoch, whilst pelvi-peritonitis may set in at another time; and the *third* difference is that, after a frightful onset, hæmatocele, when it does not terminate in death from the first attack, takes a course which decreases steadily until the next monthly period, while purulent pelvi-peritonitis has its periods of being better and worse at irregular intervals.

"In its general symptoms the adhesive pelvi-peritonitis bears a strong resemblance to menorrhagic hæmatocele. In both cases the symptoms correspond with those of a mild attack of peritonitis. Hæmatocele always preserves its character as an affection with an abrupt onset and a regular course, improving after each menstrual period, and not becoming worse until the next regular epoch. But as the symptoms are less pronounced than in the form of hæmatocele which is due to retention, the symptom derived from their course alone is more difficult to understand.

"The principal diagnostic sign is derived from the coincidence of peritonitis with menorrhagia, which menorrhagia subsides at first, then returns more or less decidedly, and continues almost indefinitely. This peculiarity of the brusque onset of a peritonitis within the true pelvis, with a menorrhagia, is *pathognomonic* of hæmatocele.

"But the local symptoms derived from the examination of the tumor will furnish us other differential signs that are of great value."†

The hæmatic tumor is likely to be confounded with a uterine fibroid, but, in distinguishing between them, the chief points to remember are that in hæmatocele the tumor forms and grows rapidly; that its formation is accompanied by grave constitutional symptoms; that the tumor is regular in its outline, and soft to the touch, growing more dense as time goes on; that its presence causes the most intense suffering, which may continue or repeat itself; and that, if it is retro-uterine, it displaces the uterus upwards and forwards as no other pelvic tumor is likely to do. The very opposite is true in the case of uterine fibroids, for they are of slow and gradual growth, without any special or dangerous constitutional symptoms; the tumor is more or less irregular in outline, and hard from the first; its presence is tolerated without severe pain, and it does not displace the womb in any particular direction.

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* See The Clinique, 1881, vol. ii., page 227.

† Jousset, *op. cit.*, page 311.

Extra-uterine gestation is always accompanied by some of the signs of pregnancy; the tumor is of slow growth, and is generally painless. If the vascular attachments of the ovum are not broken, there are no grave constitutional symptoms; but if they are ruptured, we shall have symptoms of pelvic hæmatocele superadded to those of extra-uterine pregnancy.

The diagnosis of retro-uterine hæmatocele from retroversion of the uterus is made out quite readily. The signs revealed by the conjoined manipulation; the possibility of lifting the tumor; the absence of the agonizing peritoneal pain, and of the vomiting, and the collapse of hæmatocele; and the confirmation of the displacement by the passage of the uterine sound or probe, all these enable us to detect the uterine deviation with a good degree of certainty.

In doubtful cases, and as a last resort, the exploring needle or the aspirator may be called into requisition to settle the diagnosis. But these instruments should be used with the greatest care, and not indiscriminately. They are most decidedly contra-indicated if the tumor is very large and if its contents have not solidified. If the tumor is very hard they reveal nothing; and even when it is soft the fluid may be too thick to run through the canula of so small a trocar. If upon the withdrawal of the instrument a few drops of pus are brought away, we shall know that the case is one of abcess, with or without an hæmatocele.

Prognosis.—The more sudden the attack and the larger the accumulation of blood, the greater the collapse and the greater the danger. If the tumor has been quickly formed by the rupture of an intra-pelvic vessel the danger is always more pronounced and imminent than if it has developed gradually with monthly relapses. When it follows a retention of the menses, or when it is secondary upon menorrhagia, it is always a serious affair. Occurring in one who has had a hæmorrhagic or a cancerous diathesis, or who is a sufferer from chronic hæmorrhoids, will qualify the prognosis. When it complicates the history of pelvic peritonitis, if there is reason to believe that adhesions have formed before the effusion has occurred, the result is not always fatal, for such cases are sometimes curable. When the disease goes on to suppuration, especially if it is not post-puerperal, the patient will generally recover, but after a tedious convalescence. The womb-mischief is not serious, and even the slightest cases of hæmatocele are prone to relapse. The risk of death from septic infection is in ratio with the disposition of the contents of the blood-cysts to remain fluid; the harder the tumor, other things equal, the less the danger. Spontaneous cures sometimes take place through a rupture and discharge of the extravasated and altered blood into the rectum.

Treatment.—The treatment is preventive, palliative, medical, and surgical. The *prophylaxis* of pelvic hæmatocele is only applicable to those cases which, from their being associated with menstruation, pregnancy, abortion, or puerperality, are relapsing in their tendency. In these the recurrent attacks may be averted by relieving or regulating the conditions upon which they depend. This may often be accomplished by the appropriate use of internal remedies, and especially by enforcing a menstrual quarantine, and by applying the principles of puerperal hygiene in suitable cases. If the patient has had one or more of these attacks already, whether the evidence thereof is still to be found in the Douglas's pouch or not, it will be safe to send her to bed, and to enjoin absolute rest in the horizontal position during the monthly "period." The same precaution is suitable to cases in which the "habit of aborting" increases the risk of internal hæmorrhage whenever the month comes around. In women of a hæmorrhagic diathesis, sexual intercourse either before or soon after the menses should be prohibited; and such subjects should not be allowed to make a long journey, to go "shopping," to skate, dance, or to ride on horseback at that time. If the patient has suffered from a retro-displacement of the womb, that organ should be reposited and the rectum cleared of fæces in advance of the flow. The bladder, also, should be emptied regularly.

The *palliative* treatment consists of absolute rest in the horizontal posture, and in a resort to measures and medicines for the relief of the pain. In the milder cases it will perhaps be sufficient to use hot water injections per rectum or per vaginam; to make local applications of Hamamelis and cold or very warm water, or even of ice, as some prefer, to the abdomen, or to the vulva, or to both of these parts. In extreme cases, where the suffering from the distension is agonizing and constant, some form of opiate is absolutely necessary, and Morphine may be given hypodermically or otherwise, or tampons anointed with a mixture of glycerine and sweet oil, with a few drops of chloroform, may be introduced into the vagina. In some of these cases the suffering will be greatly mitigated by making slight punctures, or scarifications, as practiced by Tilt, into the tumor, through the vaginal roof; but this expedient is not safe unless the tumor has already begun to harden somewhat.

The fainting, collapse, and coldness of the extremities must be relieved by the usual stimulants and restoratives: brandy, whiskey, milk-punch, or egg-nog, hot milk, the Carbonate of ammonia, or by inhalations of Camphor or, cautiously, of the Nitrite of amyl. The strength should be supported by a nutritious diet, and the drinks should be cold.

The medical treatment affords three principal indications:* (1) To limit and to overcome the serous inflammation, (2) to favor the absorption of the effused blood, and (3) to prevent a repetition of the hæmorrhage.

For the relief of the peritonitis, whether its existence preceded or followed the extravasation of blood, the most prominent remedies are Aconite, Belladonna, Bryonia, Cantharides, Colocynth, Rhus tox., and Terebinthina, the several indications for which are precisely the same as in other cases.

For the absorption of the effused blood, to which duty the healthy peritoneum (as the experiments of Poncet, Arloing, and Tripier† have shown) is exceedingly adapted, we may give Arnica, China, Secale corn., Arsenicum alb., Thlaspi bursa, Hamamelis, or Digitalis. The same remedies, conjoined with rest, are fitted to avert a repetition of the hæmorrhage.

A propos of filling the two latter indications, Dr. Louis B. Couch‡ has suggested an expedient which promises to be of the greatest practical service. After citing one case, in which the usual treatment had failed, and the autopsy had verified his diagnosis, he gives the following graphic particulars of another case, in which the result was highly satisfactory and suggestive:

> On June 9th, 1884, on the same street, and within a stone's throw of my former patient, I was called to see Mrs. B., aged twenty-two, married, and the mother of one child. I obtained the following history:
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> For about two weeks the patient has been in the habit of walking in her stocking-feet on the cold stone pavement of her cellar, which foolishness has resulted in a suppression of the menses which are now about ten days overdue.
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> At 5 P.M. to-day she went to stool, and while straining was suddenly taken with a very severe sharp pain in the region of the right ovary, accompanied by a terrible straining and bearing-down in the attempt to void a passage. I saw her at 7 P.M., in bed. She was still dressed, the extreme suffering preventing her from disrobing. The rectal tenesmus had greatly increased the pains, which now radiated all over the bowels and across the back. They were especially severe, however, in the right ovarian region. The abdomen was intensely sensitive to touch and pressure, and she has vomited profusely, first liquids and finally blood.
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> I found the patient with her head raised high upon pillows. The eyes were half open and turned up, exposing the sclerotic. She was stupid and dull, though groaning with the intense pain. Her speech was slow, hesitating, and difficult; the face, nose,

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* Jousset's Clinical Lectures, op. cit., p. 319.

† De l'Hématocèle péri-utérine, 1878.

‡ Vide The Chironian for February 12, 1885.

and ears cold, clammy, and ashy pale; the lips white and bloodless; the extremities icy cold, and so numb that a deep pin-prick was not felt. The pulse was weak and small.

My diagnosis was pelvic hæmatocele. I removed all pillows and prohibited any movement, or straining, or attempt to void a stool. Remedies seemingly indicated were not of the slightest use. In one hour all the symptoms had increased steadily in severity. The wrist pulse was now gone, though the heart was still beating feebly. The patient was apparently moribund. She looked like death itself. Life seemed hanging as by a thread. I recognized the fact that, unless something was done immediately, this patient would speedily follow the other to that place appointed for all the living. Drugs, however, were out of the question; if given, they would be immediately rejected, and if retained, they would be at best of doubtful efficacy. The usually advised ice-cold applications to a person in the extremity of collapse seemed worse than useless, almost criminal. Here the thought occurred to me to place the patient in a position so as to give the brain the benefit of the little blood remaining in circulation, and to prevent at the same time any further hæmorrhage from the ovarian vessels.

I raised the foot of the bed four feet higher than the head (to an angle of about sixty degrees) and left the patient in this position for thirty-six hours.

The experiment, though simple and easy of application, proved to be of the greatest efficacy and value to the patient.

The pulse soon appeared again at the wrist, and hourly grew in strength and fulness as the blood in the abdominal cavity was re-absorbed. Aside from a sensation of oppression of the chest, consequent upon the pressure of the abdominal viscera and effused blood against the diaphragm, no disagreeable symptoms were noted.

In thirty-six hours the bed was again placed in a horizontal position, but all excitement or emotion strictly prohibited for another day.

Stimulants were of course interdicted till all danger of recurrent hæmorrhage had passed, though milk, beef-tea, and soups were given *ad libitum* as soon as the stomach could retain them.

In three weeks my patient was up and attending to the lighter of her household duties, and in one month was as well and strong as ever. In due time the menses returned as usual and without incident.

As we have elsewhere said,* the surgical treatment consists in discharging the contents of the tumor either by incision or by tapping. The former method is proper and expedient only when the tumor is solid and easily accessible. The latter is now the common means of discharging the blood-cyst, but is not devoid of danger in all cases. It is not applicable before the effused blood has become encysted, or while its envelope is only partially organized and all of the contained blood is in a fluid state; nor is it safe in relapsing cases of catamenial hæmatocele especially. But, if the tumor has existed for a long time and shows little or no disposition to be absorbed or to disappear; if the original cause of the hæmorrhage is no longer in operation; if there is a very large accumulation which is not too recent, but which causes great pain and pressure, with forcing labor-like pains, and which threatens to discharge into the peritoneal cavity; if there are rigors and signs of suppurative fever, or of a sepsis, with a hyperthermic condition, there should be no delay in evacuating the tumor, either by puncture or paracentesis, as seems best. And whether it should be opened from the rectal or vaginal side must be left for circumstances to decide. The rule is to select the most dependent and easily accessible portion of the pouch; only to be careful, as Dr. Meadows has suggested, to thrust the trocar far enough to pass through the coagulated layers until the fluid is reached.

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* Ludlam's Diseases of Women, 5th edition, page 435.

Whether the tumor is discharged by surgical interference or spontaneously, its cavity should be cleansed and thoroughly washed with some antiseptic preparation. And, no matter if the discharge shall continue for weeks or months, it is quite important to continue this after-treatment so long as any vestige of the old tumor remains.

Pelvic Cellulitis.

BY R. LUDLAM, M.D.

Synonyms.—Parametritis, Peri-uterine cellulitis, Chronic pelvic cellulitis, Peri-uterine phlegmon, Pelvic abscess.

Morbid Anatomy.—The pelvic areolar tissue is the seat of this form of inflammation, and it may exist wherever that tissue is found in the vicinity of the uterus and its appendages. Its most frequent seat is, of course, where the cellular tissue is most abundant, as between the layers of the broad ligament, behind the womb and within the Douglas's pouch, between the uterus and the bladder, directly around the rectum and the uterine cervix, especially the abdominal portion of the latter, in the iliac fossæ, along the psoas muscle upwards to the kidney, and downwards into the gluteal region by the great sciatic notch. It is also found about the urethra, in the recto-vaginal septum, and in the recto-sacral space. If there is any areolar tissue between the peritoneum and the uterus itself, this form of cellulitis may be developed in that locality and give rise to what has been called uterine abscess. Any portion of this connective tissue which may lie beneath the pelvic fascia, or within or between the layers of the pelvic peritoneum, may become the seat of this lesion.

Ætiology.—Most cases of pelvic cellulitis bear a certain relation to pregnancy and labor, and hence are either puerperal or post-puerperal. Under these circumstances they are of traumatic origin, and are essentially the same, whether they follow abortion or labor at term. Some of the most intractable examples of pelvic cellulitis arise from the injury done to the soft parts by intentional abortion, especially when it is mechanically induced.

The non-puerperal cellulitis may result from the forcible introduction or the prolonged retention of the sound and the sponge or other tents. The wearing of intra-uterine pessaries, even the best of them, is very apt to induce it. Incision of the cervix uteri, whether for the cure of obstructive dysmenorrhœa, for the arrest of uterine hæmorrhage, or for the exploration of the uterine cavity, is not an unfrequent cause. It has followed amputation of the cervix, ovariotomy, trachelorrhaphy, the ligation of polypi, the excision of hæmorrhoidal tumors, the operation for vesico- and recto-vaginal fistulæ, and also that for ruptured perinæum. It has also resulted from the use of very severe escharotics, as the *potassa cum calce;* the wearing of vaginal pessaries for a long time without removal; excessive and too forcible coitus; and the extension of corporeal metritis and ovaritis to the areolar tissue about the uterus and between the layers of the broad ligaments. In very rare cases it has originated from a fall or a blow upon some portion of the pelvis or the abdomen, and when it occurs in young girls, especially, this cause should be particularly inquired for.

Clinical History.—The clinical history comprises four stages of the affection: (1) that of congestion; (2) effusion and induration; (3) resolution; (4) suppuration. The first, or the congestive, stage may occur a few hours after delivery or after the accident which has induced the attack. It may begin abruptly, and is usually, but not always, accompanied by a chill. If the chill is lacking, there will be rigors, which vary with the severity of the case and the nervous or exhausted condition of the patient. If the congestion is extensive and active, the febrile reaction will be very decided. The tongue is furred, and there is more or less nausea and vomiting.

These symptoms are accompanied, or followed almost immediately, by intra-pelvic pain and distress. The location of this pain varies with the seat of the inflammation. If the cellular tissue between the broad ligaments is attacked, the pain will be referred to the corresponding side of the pelvis, in which it will be deep-seated and very severe. If the same tissue surrounding the uterine neck is the seat of the lesion, the suffering will be in the upper part of the vagina, and contact with this organ, even by the exercise of the most delicate "touch," will be insupportable. If the peritoneum is also inflamed, the pain will be acute and lancinating in character. Most of the pain experienced, however, is ascribed to the pressure of the effused fluid (which has escaped into this tissue) against the neighboring organs. In many cases the bladder, and in others the rectum, are thus mechanically pressed upon, giving rise to strangury and tenesmus, which are not relieved by the usual remedies. Very often, more especially after the tumor caused by the effused serum has been formed, the pain is described as throbbing and paroxysmal. It is usually not diffuse, but local and circumscribed in its extent. In acute cases the congestive stage is limited to a few hours, while in chronic cases it may continue longer, and is very apt to repeat itself, involving other portions of the same tissue in the successive attacks.

The effusion, which brings relief to the most acute suffering, takes place after a few hours, the serum being poured into the meshes of the areolar tissue or beneath some portion of the pelvic fascia. The amount of exudation is in proportion with the extent of the local congestion and the condition of the patient's blood. The weaker she is, and the thinner the blood, the more copious the effusion. But, whether very limited or not, it is characteristic of this effusion that it very soon solidifies, becoming hard and firm, almost like a fibroid, to the touch. Its form, however, is irregular. It may be round or oval, angular or flat, in the shape of a placque. Its density varies somewhat, being softer in the case of those who are in a weak and feeble condition, and more firm in those who are strong and well in other regards.

The location of this tumor varies, being most frequently in one of the iliac fossæ or behind the uterus. It may lie in front of the womb and behind the bladder, or it may involve the whole or a part of the cellular tissue in the wall of the vagina, in which case the hardened portion will feel like a plaster cast of that passage. Peri-rectal cellulitis is accompanied by an induration and deformity of the rectum which are sometimes mistaken for cancer.

This stage of effusion, with its resulting tumor, may continue unchanged for a variable period, ranging from one week to a month. There is no fixed limit to its duration. Sometimes, in consequence of a relapse, the congestion is again established, and the resulting effusion following, there is an increased pouring out of serum and a marked and sudden growth of the tumor. Again, the inflammation being passive, the tumor becomes insensibly larger. Or it may develop in the right iliac fossa, and when some considerable time has elapsed, commence to grow and finally attain a marked development in the left one. Relapsing tumors in the same locality are by no means rare.

If, happily, the stage of resolution comes spontaneously or as the result of appropriate treatment, the tumor may gradually soften and finally disappear without any more serious result. When the previous general condition has been good; when gestation and labor have been accomplished without any great loss of strength or of nervous force; when the patient has been well nursed and nourished, and properly cared for; and when she has not been exposed to any serious epidemic, or had any serious inflammation during her lying-in, resolution of the tumor is more likely to follow.

But when she has been ill for a long time, and been subjected to a round of local and mischievous treatment that has developed the uterine cachexia, and almost destroyed her vitality; when she is of a highly scrofulous diathesis; or when she has had one or more pelvic abscesses already, we could hardly expect so desirable a result. It is well to remember that when resolution does occur, it must take place very slowly, and that recovery by this process is a very gradual affair.

Suppuration advances more rapidly in the puerperal than in the non-puerperal state. In the former the disease is almost always associated with more or less of peritoneal inflammation and effusion, and the serum that has been exuded has a peculiar tendency to become purulent. Indeed, in such cases this change often comes on rapidly, and portions of cellular tissue that are involved participate therein.

But in the ordinary chronic form of pelvic cellulitis the tumor softens slowly, so slowly indeed that in some cases we can only be assured of the formation of pus by the rigors or recurrent chills, and the general constitutional symptoms of suppurative fever, or by the spontaneous discharge of pus through the bowel, or some other outlet. Usually, however, the bi-manual examination, when carefully and repeatedly applied, will enable us to recognize the breaking-down of the hardened mass, and the development of an abscess. Sometimes there is so much tenderness and pain that this exploration cannot be so thoroughly or so frequently made as to satisfy us of the rate of progress in the suppurative process; but that knowledge is not always important, especially if we remember the tendency to suppuration, sooner or later, in the great majority of cases.

The varying locality of the tumor, which may be seated in any portion of the pelvic connective tissue, suggests the possibility that either or all of the organs by which it is covered may be involved in the abscess if one should form. Thus the bowel, the bladder, the uterus, the broad ligaments, the Fallopian tubes, and the ovaries may become the seat of these abscesses, and, in case of a spontaneous rupture thereof, may afford a means of escape for the contained pus. If the pus has formed at the superior strait, it may pass along the course of the muscles, beneath the pelvic fascia, and escape with the femoral vessels, so as to point near the groin. Sometimes it passes backward through the great ischiatic foramen, and forms an abscess in the region of the hip; or it may even point at the great trochanter of the femur. In rare instances it perforates both the uterus and the bladder, leaving a fistula between them; and still more rarely it is discharged directly into the peritoneal cavity.

A peculiarity of pelvic abscesses of this kind is that they are almost always recurrent; it seldom happens that the patient escapes with a single one. More often they have two or three, and then, at long intervals, as many more. It is not rare for them to continue to discharge through fistulous openings for months and even for years.

Symptoms.—Puerperal cellulitis is much more likely to have an initiatory chill than is the non-puerperal variety. In the latter, the rigors and chills are usually reserved until the suppurative process is established, when they recur without any regularity of type. In lying-in women the more pronounced the chill at the onset of an attack of pelvic cellulitis, the greater the probability that the case is complicated with pelvic peritonitis. In chronic cases the repetition of the chill at long intervals signifies the formation of a relapsing abscess, and will lead to a recognition of the tumor by the patient and her physician.

The pain and suffering are neither constant nor characteristic. In exceptional cases, occurring in highly scrofulous women, the tumor is of the nature of a "cold abscess," and the stages of congestion, effusion, and induration may involve so little discomfort as to come on and develop insidiously without exciting the suspicion of any serious local inflammation. More often the pain is referred to some particular exertion, or position of the body, straining at stool, coughing, or fatigue from riding or walking; and not unfrequently these symptoms lead to the suspicion that the patient is suffering from uterine displacement.

The kind of pain experienced often depends upon the location of the lesion. When the peri-rectal cellular tissue is attacked, the suffering is referred to the rectum, and the pain is dysenteric, with an almost unbearable tenesmus, which is greatly aggravated at stool and upon standing or walking, particularly if the patient is subject to hæmorrhoids. For the same reason, if the inflammation is seated in the connective tissue between the uterus and the bladder, the latter organ suffers most. With inflammation and abscess of the broad ligament the pain may be in one side of the pelvis exclusively; while, if it involves the peri-vaginal tissue, the poor woman will suffer in almost the same way as if she were the victim of vaginismus.

The common form of complaint is from intra-pelvic weight and distress; inability to stand without a dragging sensation about the hips and the loins, that often is sickening to the last degree; burning pains, which may be general or local, within the pelvis or the abdomen, or both; and sharp, lancinating pains, if any considerable extent of the intestinal or the pelvic peritoneum is involved.

The conjoined "touch" discovers and locates the tumor, which is hard and dense at first, but softens as time goes on. If the swelling is at the roof of the vagina, the uterus will be anchored; but if it is limited to either of the broad ligaments, that organ may still have some latitude of motion, especially upwards and downwards, but not laterally. In old cases the broad ligament on the affected side is almost always shortened. Wherever the tumor is located, it is characteristically immobile; there are few, if any, exceptions to this rule. The sensibility of the tumor varies greatly in different cases, being very marked in some instances. and quite absent in others. If the tumor develops in either of the iliac fossæ. the corresponding leg will usually. but not always. be flexed. This retraction of the thigh relieves the pain by relaxing the muscles in the immediate vicinity of the tumor. It is involuntary. and more or less complaint will be made when the leg is forcibly extended.

If the attack ends by resolution. these symptoms gradually subside, and recovery follows. But in case of suppuration. the pain increases, and the intra-pelvic throbbing and distress become constant. Constitutional symptoms soon follow. and signs of suppurative fever. such as rigors. increased bodily temperature and hectic come in their train. Weeks. or even months. may be consumed by this process, and an abscess of this kind which opens spontaneously into the rectum, the vagina. the uterus. or the bladder. may continue to discharge for a very long time. Sometimes such abscesses refill, and then relieve themselves periodically.

"A sudden escape of pus into the general peritoneal cavity is, as a rule. followed by fatal peritonitis. Or decomposition of the pus may cause fatal septicæmia. But not unfrequently absorption of large collections of fluid takes place. and the patient returns to health. Resorption. however. is generally a very slow matter; nor does it often happen without leaving some exudation or adhesion, which feels like a circumscribed tumor at the pelvic roof."*

As in other forms of peri-uterine inflammation, the uterus is almost always. and to a greater or less degree. displaced. The size and location of the tumor will determine the direction of this displacement; for the womb may be pushed to either side. or forwards or backwards, or badly flexed. as well as prolapsed by it. and there can be no doubt that much harm has been done when such cases have been ignorantly subjected to mechanical treatment by pessaries.

Occasionally we find that severe and intractable cases of menorrhagia depend upon peri-uterine cellulitis. but dysmenorrhœa is a more frequent complication. Amenorrhœa and scanty menstruation sometimes result from the same cause. When cellulitis has followed an early abortion in a young married woman. she is very apt to remain sterile. Chronic ovarian disease is also a frequent accompaniment and sequel of pelvic cellulitis.

Diagnosis.—The relation between the connective tissue within the pelvis and the peritoneum within the same cavity being as intimate as that which exists between the pleura and the lung, we would expect it to be difficult, and sometimes impossible, to differentiate between pelvic cellulitis and pelvic peritonitis. In many cases they undoubtedly merge, and thus become the counterpart of pleuro-pneumonia. But usually, and especially in the non-puerperal variety, we may and should separate them, not only because it is more satisfactory to know what particular disease we are treating as a condition of intelligent treatment, but because we should know what impends by way of sequelæ when we seem to have cured either of these two affections.

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* Practical Manual of Diseases of Women, etc., by Dr. H. Macnaughton Jones, London, 1884, p. 257.

After abundant opportunities for clinical study and reflection, the author is prepared to indorse the following propositions offered by Professor Thomas:*

"1st. Peri-uterine cellulitis is rare in the non-parous woman, while pelvic peritonitis is exceedingly common.

"2d. A very large proportion of the cases now regarded as instances of cellulitis are really those of pelvic peritonitis.

"3d. The two affections are entirely distinct from each other, and should not be confounded simply because they often complicate each other. They may be compared to serous and parenchymatous inflammation of the lungs, pleurisy, and pneumonia. Like them they are separate and distinct, like them affect different kinds of structure, and like them generally complicate each other.

"4th. They may usually be differentiated from each other, and a neglect of the effort at such thorough diagnosis is as reprehensible as a similar want of care in determining between pericarditis and endocarditis."

The tumor arising from pelvic cellulitis, like pelvic abscess due to other causes, may be confounded with a uterine fibroid. The points of differentiation are that the former is fixed, and not spherical in its form; that it has developed quite rapidly, with inflammatory symptoms; that it becomes less dense and firm in texture as it grows older; and that, while it is located in proximity with the womb, it is not closely attached to it. Extra-uterine fibromata are rounded in form, free and mobile; they grow very slowly and insidiously, and, so far as we know, are never preceded by symptoms of local inflammation; their texture does not soften until they begin to undergo some form of final degeneration; and their connection with the body or fundus of the womb can always be made out. Both these kinds of tumor may be accompanied by menorrhagia, but it is much more common with fibroids than with the growth that is formed of indurated and inflamed cellular tissue.

In all the varieties of pelvic hæmatocele, whether puerperal, menstrual, or post-peritonitic, the formation of the tumor is rapid, and is accompanied by symptoms of sinking, exhaustion, and collapse that are lacking in cellulitis. Moreover, the hæmatic tumor is almost always retro-uterine; is soft at first, and hardens with the coagulation of its contents; relapses, if at all, at the mouth, and affords a bloody fluid when it is tapped by the exploring needle or the aspirator-trocar.

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* A Practical Treatise on the Diseases of Women, 5th edition, p. 488.

Prognosis.—One of several results of a most serious kind may follow in this disease: (1) either the patient may die of a coincident peritonitis; or (2) from the rupture and discharge of the abscess into the peritoneal cavity; or (3) the abscesses may recur, and continue to discharge until her strength and vitality are exhausted; or (4) the long-continued lesion and its consequent drain may finally develop a form of intra-pelvic and abdominal tuberculosis.

When the attack ends in resolution, the tendency to relapse is less marked, but it is almost never quite overcome. For while the smallest patch of indurated tissue remains the fire may be lighted again, and sometimes from the slightest causes, such as the passage of the uterine sound, repositing the displaced organ, or the use of a sponge-tent, straining at stool, or the occurrence of a severe fit of coughing. Nor does it follow that because a first attack of pelvic cellulitis has been aborted by appropriate treatment, aided by a good constitutional condition, a subsequent attack will turn out as well. The second or the third relapse may terminate in suppuration and abscess.

But while the prospect of a radical cure of this disease is not very encouraging, the proportion of such cases that are successfully managed is steadily increasing, and we should persevere even under the most unpromising conditions. The anchorage of the uterus in some abnormal position, and the resulting sterility, as well as other unpleasant sequelæ, are trifling matters compared with freedom from the invalidism to which these patients are almost constantly subjected during the active stages of the disease.

Treatment.—Whether in an acute or a chronic case, the first thing to be done is to place the patient in the recumbent posture. Rest of the affected part is quite as necessary in this disease as it is in the case of a broken leg; for the elastic threads of the pelvic cellular tissue in which the womb is swung are very susceptible of injury when they are inflamed. Circumstances sometimes compel a woman who is ill with this affection to keep on her feet and to continue her work when she should be in bed or upon the lounge. Others are advised or abused into active exercise when they ought to remain quiet, under the mistaken idea that their nervous symptoms and general ill-health would improve if they were only more active and resolute. In no other disease, perhaps, is there a more general ignorance of the first principles of an intelligent treatment than in this.

It is not enough that the patient should undergo the menstrual quarantine which her periodical increase of bad feelings will almost surely necessitate. She must also keep quiet between the periods, and not presume to walk or stand, or ride about as if the consequences were not, and could not possibly be, serious. And whatever interferes with the repose of the pelvic organs, as constipation, strangury, coitus, or coughing, should be carefully guarded against and interdicted. That posture of the body, whether upon the back or upon either side, which is most comfortable should be chosen and permitted.

The introduction of pessaries to cure or correct an incidental deviation of the uterus is always harmful if there is cellulitis; and the resort to an operation for laceration of the cervix uteri, or even of the perinæum, is contra-indicated by the same condition. So also is the use of the sound, and of any and all measures to open or to expand the cervical canal for any purpose whatever. Tight lacing, skating, dancing, and the sewing-machine should be peremptorily forbidden.

No case is more pitiable than an old one of pelvic cellulitis in which relief from suffering has been obtained by a long and increasing resort to opiates. Under these circumstances not only is the patient a nervous wreck, but her nutrition has become so impaired and demoralized that the suppurative tendency is facilitated and fastened upon her. There can be little doubt that many such women would have recovered from this disease by the process of resolution if they could have escaped this very phase and effect of the opium habit.

One of the means suggested for affording sleep and rest in the proper posture is set forth by Dr. Van de Warker, in a recent publication.* It consists in placing the patient in a hammock which is swung in the room or in the open air, and which furnishes the proper postural treatment with motion, the latter being an effectual means of controlling the pain. In protracted cases this expedient would certainly be available and harmless.

The use of electricity, both for assuaging the pain and for promoting the absorption of the tumor or the induration, is very much relied upon by some experienced physicians. And so also of hot fomentations (the heat being especially grateful in such cases), the warm or hot sitz-bath, and the oleaginous collodion, and camphorated oil applied over the iliac regions. Other applications are dilutions of Aconite, Hamamelis, or Arnica tincture in hot water, and of emollient poultices of bran, linseed, or hops.

Within the past few years, however, the most popular method of local treatment for this affection has been the use of hot water vaginal injections, a resource that was first advised by Dr. Emmet, of New York.† For practical purposes, the position on the back, with a bed-pan to elevate the hips, will be found the most convenient; and the injection should be given by the nurse, or another person, and not by the patient herself. With reference to other details, Dr. Emmet says:

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* The Treatment of Pelvic Indurations and Adhesions. Trans. of the Am. Gynæcological Society, vol. iii., p. 342.

† The Principles and Practice of Gynæcology, 1880, p. 118, *et seq.*

"The temperature and quantity of water are to be varied according to circumstances. When treating the early stages of inflammation, it is necessary that the temperature should be elevated rapidly from that of blood-heat to 110°, or to as high a degree as can be borne by the patient, and that the injection should be often repeated.. For ordinary use a gallon of water, two or three degrees above blood-heat, is generally sufficient, but the temperature must be maintained at the highest point by the addition of hot water from time to time. The hour of bed-time is generally the best in which to seek for the beneficial effects of hot water on the reflex system in allaying the local irritation; for prolonged vaginal injection, at a high temperature, will often, when given by an experienced hand, act with more promptness than an anodyne in allaying the nervousness and sleeplessness of an hysterical woman. I have frequently known a patient, after being well rubbed and having received an injection, to fall asleep before the nurse had completed the process, and to be so overcome with drowsiness as to be but little disturbed on removing the bed-pan.

"In rare instances, and from a condition I am unable to explain, cases are met with where a sense of weight and an uncomfortable feeling are experienced about the pelvis after an injection of water at the usual temperature. In some instances so much disturbance resulted, that occasionally I was obliged to abandon its use. But I have long since ascertained that the injection is well borne at a lower temperature, generally about 95°, and that after a week or two the temperature can be gradually increased."

Through their indiscriminate employment it is morally certain that this class of injections have done as much harm as good. The decided effect of hot water to control the intra-pelvic circulation, and, in case of local congestion, to unload its capillary vessels, may, and should be, taken advantage of in the treatment of the first stage of pelvic cellulitis. But, unless the case is far advanced and there are constitutional or other reasons why we should hasten the process of softening and of suppuration, these injections may have a mischievous effect after the effusion and the induration have occurred.

In order to facilitate resolution, care must be taken to have the patient well nourished with as substantial a diet as she can digest, and to counteract any malarial complication or lurking cachexia. In some cases good results are obtained by the use of stimulants combined with milk and eggs, or from the use of malt liquors, with or without quinine.

But if suppuration ensues, the question of evacuating the tumor will need to be settled. If the abscess points externally, it should be lanced as soon as it is ready to discharge; but we should wait until the integument is thin, and be careful to puncture it as close to the outer half of Poupart's ligament as possible in order to avoid the sheath of the femoral vessels, and not to open the peritoneal cavity. If the fluctuation is most decided within the pelvis, it is better to open it from the vaginal than from the rectal side. It is much safer to discharge such a collection by means of the aspirator than in the old-fashioned way. And this method has the additional advantage that it may, if necessary, be resorted to at an earlier period, and in case of deeper-seated abscesses, than would have been safe or expedient a few years ago. However, the spontaneous opening of these abscesses into the rectum, or the vagina especially, is desirable and ought always to be facilitated.

The medical treatment concerns a variety of general and special indications that are of the utmost importance. The stage of the disease, as well as its various complications, and more especially the menstrual derangements that accompany or depend upon it, have each their peculiar significance, and should have their proper weight in determining the choice of a remedy. Among the most important of these indications are the following:

Aconite is suited to the congestive period, when there is a high degree of fever with or without rigors, unrest, anguish, and fear of death. Its action upon the intrapelvic capillaries is prompt and decided, but it should be given in a low potency and frequently repeated.*

Veratrum viride is adapted to the same period of the disease, but more especially in lying-in and nursing women, and in those in whom an erysipelatous inflammation either alternates with, or predisposes to, pelvic cellulitis. It has a wonderful power to control and regulate the vascular movements, to equalize the circulation through the areolar tissue within the pelvis, as well as in other parts of the body, and to stamp out a local congestion that would almost inevitably result in an inflammatory exudation. It may be given in the second or the third decimal dilution, and in urgent cases the dose should be repeated every half hour for two or more hours, after which it may be given less often.

Belladonna.—If the attack has developed from erysipelas, or if there is evident local congestion, with a predominance of nervous instead of febrile symptoms, dryness of the fauces, dilatation of the pupils, and flushed face, this remedy will do good service.

Arnica may be given with Aconite in hourly alternation, or less often, if the case is traumatic in its origin.

Apis mellifica has a curative relation to cellulitis in various portions of the body and in the pelvis as well. Its special indications include diminished or suppressed menstruation, with pains in the right iliac or ovarian region, tenderness over the uterus, sensitiveness of the abdomen, puffiness of the features, œdema of the extremities, and a general tendency to anasarca. As a matter of clinical experience it is of more value in stimulating the absorption and removal of limited tumors that arise from effusion into the pelvic areolar tissue than any other single remedy. It should be given in the form of a trituration, and not in the tincture.

Calcarea carbonica and **Calcarea jodat.** may be given in scrofulous subjects, the former to counteract the tendency to a cachexia that involves the structural and the functional activity of the internal generative organs through a chronic inflammation of their investing tunic, and the latter to promote the resolution of cellular induration anywhere within the pelvis.

Colocynthis will frequently control the pain and abort a coincident peritonitis, especially when it occurs in the region of the ovaries, or in the visceral peritoneum within the pelvis or the abdomen. It has a marked effect to prevent the serous effusion into the peritoneal cavity which sometimes complicates severe attacks of pelvic cellulitis.

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* For an interesting paper on Aconite in Pelvic Cellulitis, see Prof. Bailey's report in the Clinique, vol. v., p. 301.

Bryonia and **Rhus tox.**—The same remarks apply to these remedies as to Colocynth; but they are better suited to rheumatic subjects.

Hepar sulphuris.—The indications for this remedy are of a general character, it being suited to women of a scrofulous diathesis in whom the cellular inflammation has a decided tendency toward suppuration. Whenever this process is desirable, or inevitable, and we wish to hasten it, this is a most appropriate and useful remedy.

Mercurius in either of its forms, but more especially the *M. jodatus*, is adapted to similar conditions of the general constitution; but its best effect is in aid of resolution.

Tartar emetic has a specific influence in removing patches of induration which are neither very extensive nor very firm in their texture. In these limited tumors, especially if the patient is of good general health, it seems to take hold in some such way as it does in cases of areolar hyperplasia of the uterine cervix. By its persistent use in the third decimal trituration, repeated three or four times a day, these indurations begin to melt, and finally disappear.

Terebinthina.—In cases of pelvic cellulitis following circumscribed peritonitis, ovaritis, or typhlitis, the Terebinth may be given with a good result in the second decimal trituration. If the lesion involves the bladder and implicates micturition, the indication is also a good one.

Silicea for excessive or prolonged suppuration, especially when there is a train of nervous symptoms which are referable to this drain, and when there are fistulous openings into the rectum or other organs.

DISEASES OF THE VAGINA.

BY JULIA HOLMES SMITH, M.D.

VAGINITIS.

Synonyms.—Vaginal leucorrhœa, Blenorrhœa, Blenorrhagia, Colpitis.

Definition.—Vaginitis is an inflammation of the mucous membrane lining the vaginal canal, characterized at first by heat and tenderness; later, by a discharge from the muciparous follicles, which may be creamy, yellowish, stringy, or purulent. Vaginitis may occur in children, young girls, and middle-aged women. It may be simple, specific or granular. There is also a species of vaginitis associated with the presence of diphtheritic poison in the system, in which we find the characteristic patches on the surface of the vagina, the disease progressing there exactly as it does in the other parts.

Ætiology.—The causes of vaginitis are, many of them, similar to those of catarrhal inflammation in other parts of the organism. A sudden cold, produced by exposure to the weather, may cause an attack of vaginitis. The use of vaginal injections of cold water frequently sets up inflammations. Foreign bodies, as an ill-fitting pessary or instruments used for masturbation, a tampon, or a sponge retained until it becomes foul, will cause colpitis. Traumatic inflammation is sometimes set up by the careless use of caustics or of the forceps in labor. There is a form of vaginitis associated with pregnancy, which is merely the result of an excessive hyperæmia, and is frequently characterized by a very excoriating discharge. The extension of the exanthems to the vagina is a complication not at all uncommon, especially in scarlet fever. Fritsch alludes to a species of vaginitis found in old women, which he calls *vaginitis adhæsiva.* It is circumscribed, the epithelium disappears in patches, and the granulating surfaces adhere to each other. He considers the ætiology obscure, but refers the condition to the fact that the secretion of a catarrhal cervix is apt, in old women, to remain in contact with the vaginal walls, because menstruation has ceased, and coition is not indulged in; this unhealthy discharge has a macerating effect on the vagina, which is facilitated by the fact that the layer of pavement epithelium becomes gradually thinner with advancing age.

Gonorrhœal infection causes vaginitis, and in young children ascarides find their way from the rectum to the vagina, setting up more or less inflammation, and causing much discomfort.

Symptomatology.—The disease may be ushered in with a chill, the patient complaining of a pain in the back; there is a wiry, rapid pulse, local heat and burning and itching in the vagina. The walls of the vagina at first seem hot and dry, and examination of any kind would prove exceedingly painful. Later, as with all catarrhs, there is a free discharge, which sometimes is purulent, at others so corrosive as to induce vulvitis, and occasionally there occurs as a sequence to vaginitis an abscess of the labia majora. In an acute case of vaginitis, examination will reveal the labia swollen and the vaginal canal very red; a glass speculum would show the surface very much congested; if the case be not seen until somewhat far advanced, opening the labia minora will allow a free escape of muco-purulent matter. The epithelium is thrown off very early in this disease, and Thomas alludes to the fact that "this lining has been thrown off entire, constituting a cast or mould of the canal very similar in character to the dysmenorrhœal membrane which is occasionally expelled from the uterus."

Diagnosis.—This is not difficult, because the sensations of heat, burning, smarting, itching, are localized. The chief duty of the attendant is to discover the variety with which he has to deal. From gonorrhœal inflammation a differentiation of simple vaginitis is sometimes difficult, the objective and subjective symptoms often being quite similar; the history of the case, the character of the patient, and the fact that painful micturition is one of the first symptoms in gonorrhœal inflammation, and that in simple colpitis this symptom comes on very late, if at all, will establish the diagnosis. In gonorrhœa the smarting and burning is first felt in the urethra and extends to the vagina. The traumatic variety of vaginitis can only be discovered by an examination, and in cases where diphtheria or scarlet fever have associated with them a vaginitis, the characteristic deposit of the one, and the eruption of the other, are readily discovered. The presence of granular vaginitis is discovered by the touch, the papillæ feeling like seeds under the finger.

CHRONIC VAGINITIS.

Chronic catarrh of the vagina is a sequence of an acute attack which has not been relieved, and may continue for years, the patient thinking that the discharge is only an indication of weakness. There is almost no pain and the patient rarely complains of the heat which characterizes the acute stage; the hypersecretion alone leads her to consult a physician. Scanzoni says, when the mucous membrane is in a perfectly normal condition, as it is scarcely ever met with except in women who have never had children, and have not abused coitus, the quantity of liquid secreted is not very abundant. There is only that which is necessary to maintain the surface of the mucous membrane humid and smooth. By speculum-exploration, this discharge appears in the form of an almost limpid mucus, very liquid, covering the vaginal walls. A bit of paper, dipped in litmus and placed in contact with the mucous membrane, is, ordinarily, speedily colored red. A microscopical examination does not disclose any remarkable element aside from a quantity, quite inconsiderable, of pavement epithelium due to catarrhal inflammation of the mucous membrane. It is either white like milk or yellow like cream or pus. The quantity of organized elements which the mucus contains increases with the thickness and yellowish color of the liquid. German pathologists besides Scanzoni have found a considerable number of infusoria in this vaginal discharge. They are found most frequently in the yellow, puriform, acid mucus, never in the normal mucus. Occasionally a few vibriones are found in the mucus: this is a vegetable form of very fine, stiff, long filaments which seems like the algæ of the mouth. A careful consideration of the characteristics above mentioned of the vaginal leucorrhœa would prevent the confusion which arises in many minds in regard to the origin of the discharge from the female genitalia. If the chronic vaginal inflammation with its attendent catarrh results from uterine trouble, the blennorrhœa cannot be cured until its cause is removed. The complications possible are a degeneration of the mucous membrane of the vagina, and also an extension of the inflammatory action to the vulva, and beyond to the external skin.

Prognosis.—A cure may be anticipated for acute vaginitis, under homœopathic medication. When the case has become chronic, and the follicles of the vagina are hypertrophied and pour out constantly an abnormal discharge, the prognosis is less hopeful.

Treatment.—This must be aimed at a reduction of the inflammation and the building-up of the system, so as to lessen the readiness to take cold; by local means we seek to quiet the pain and irritation.

Absolute rest in the horizontal position is essential; good results are had from frequent injections of warm water or bran-water, or a preparation of Muriate of hydrastis with glycerine, one drachm to the ounce, dissolved in one pint of tepid water, to be thrown into the vagina three or four times a day. An ointment made of one drachm of Belladonna to two ounces of lard may be applied with the finger, smearing with this the whole surface of the vaginal walls. Great relief is sometimes obtained from an injection into the vagina of fifteen grains of chloral hydrate to an ounce of water, three or four times a day.

Care must be taken to decide upon the cause of the vaginitis and to remove that.

Therapeutic Indications.—Aconite for fever, with dryness of the vagina, and a chilliness or rigors up and down the back.

Belladonna.—Stitches in the vagina with great heat and soreness as if excoriated. Headache and pressure in the eyeballs, with dread of being touched.

Cantharides.—When there is a smarting and itching, with dysuria, a few drops of water passing at a time, and a constant desire to urinate.

Arsenicum alb.—When the discharge from the vagina is very acrid, excoriating the part with which it comes in contact. Especially valuable when the patient is subject to profuse discharge at menstruation.

Carbo vegetabilis.—When the mucous membrane is in an aphthous condition.

Mercurius sol.—When there seem to be little ulcerations of the vaginal and mucous membrane, and the slightest motion causes a raw feeling.

Calcarea carb.—Itching and stitches in the vagina; milk-like leucorrhœa; the patient suffers with cold hands and feet.

Sepia.—Itching in the vagina, with a yellowish discharge; leucorrhœa especially profuse after micturition. Sometimes the discharge is corrosive and has a fetid smell. Especially adapted to nervous, sensitive organizations, liable to diseases of the skin. If the inflammation has extended to the urethra, *Cannabis indica* may be valuable.

Cimicifuga is suitable in vaginitis with pain in the ovaries; especially suited to rheumatic subjects who complain of headaches.

Kreasotum.—Violent itching in the vagina and labia, with yellow, stringy leucorrhœa.

For the diphtheritic inflammation of the vagina the remedies must be chosen with the same care as when this malady attacks the throat or other parts of the organism.

Iodide of mercury, Iodide of arsenic, Apis, Lachesis, Nitric acid, should all be carefully studied and applied according to the totality of the symptoms. I have used with success a solution of *Kali Permanganate* applied frequently over the surface of the vagina by means of a sponge held in my dressing-forceps. This complication shows that the diphtheritic poison has attained a strong hold upon the system, and great attention should be paid to nourishment of the patient, in order to sustain her. The prognosis in this form of vaginitis is necessarily grave.

For the more common forms of vaginitis consult also: Silicea, China, Sulphur, Baryta carb., and others.

PRURITUS VAGINÆ ET VULVÆ.

Definition.—Pruritus vaginæ, or vulvæ, may be defined as hyperæsthesia of the nerves of the mucous membrane covering these parts, characterized by intense itching, persistent or intermittent. There may be an eruption on the parts, or the irritation may come from a morbid state of the nerves of the mucous membrane, in which latter case the surface is dry and shining—almost glazed.

Scanzoni makes the pruritus vaginæ the primary malady with the possibility of extension to the vulva. Thomas, on the other hand, and Ludlam, following him, treat of this disease as commencing at the vulva and extending within. It seems to me that both authors may be right and wrong at the same time. The line of progress which the disease takes depends wholly upon its cause. If due to inflammatory conditions of the vaginal walls or to excoriating discharges from the uterus, it necessarily begins with the vagina. If due to causes localized in the vulva, then the course of the disease is from without inward.

Ætiology.—Pruritus is the result of very varied causes. An abnormal condition of the nervous system may lead to this hysterical condition, the torments which the irritated nerve filaments inflict upon the victim sometimes giving rise to convulsions. It may result from an inflammatory condition of the mucous membrane, or may be caused by contact with irritating discharges from the uterus or from the urethra. It is one of the symptoms of constitutional syphilis, and may also be due to diabetes. The itching is sometimes caused by short bristly hairs which, turning inward, wound the face of the vulva; and the presence of pediculi among the hairs of the mons veneris may occasion it. The affection is not uncommon in pregnant women, and should then be classed with the neuroses, unless there exists some special diseased condition of the genitalia.

Pathology.—The pathological changes of the mucous membrane in pruritus depend somewhat upon the various causes which originate the disease. If the malady be a simple neurosis, it is hot and dry, and the existing secretion is only produced by the manipulation which the patient feels impelled to make in order to relieve the terrible itching. If pruritus results from a poisonous discharge from the uterus or vagina, the membrane will be excoriated and raw, and there may possibly be patches of erosions which bleed at the slightest touch, and in this condition we may expect to find vaginitis as a complication. If from specific constitutional diseases, the characteristic indications will be visible. The presence of pediculi is manifested by the eruption which follows in their wake. If the disease continues long unrelieved, the scratching and rubbing cause the parts to swell and thicken, and often a wound is made which will suppurate. The general health declines. Sleep deserts the sufferer, and all the consequences of malnutrition from defective innervation assail the victim.

Treatment.—The treatment must be directed to the removal both of the constitutional and predisposing causes. Anti-psoric remedies will naturally suggest themselves in some cases, and nerve tonics or sedatives in others. Patients having this local irritation always need specific directions for the utmost care in keeping the parts perfectly clean. A careful examination is essential to a perfect diagnosis. If the irritation is caused by the presence of short, bristly hairs which turn in and chafe the mucous surface of the labia, these should be removed with pincers, and the case will cure itself. When aphthous patches cause the irritation, applications of borax will be found valuable. Cases dependent upon ovarian and uterine diseases must receive proper treatment for such maladies.

The pediculus pubis should be treated with mercurial ointment diluted one-half with vaseline or cosmoline, to be applied once a day; after about twelve hours the parts should be carefully washed with soap and water; this treatment is to be continued so long as there is any indication of the presence of the parasites. Scanzoni recommends hip baths and injections of tepid water to which may be added a little glycerine. He also commends a liniment of chloroform, consisting of two parts of chloroform to thirty of almond oil, applied with a brush to the walls of the vagina and the external parts. An ointment made of Gelsemium, ʒj to ℥j of vaseline, applied to the itching surface, may be useful. Plantago cerate has cured some cases, and others only secure relief from the use of suppositories of ⅛ grain of morphia. This disease exhausts the patience of doctor and patient because no local application retains its efficiency long.

Nitrate of silver, ʒj to ℥j of water, is valuable in some cases; it should be applied to the walls of the vagina with a camel's-hair brush. If the constant rubbing has produced inflammation, let the patient keep a roll of cotton wadding covered with glycerine in the vagina to separate the walls.

Therapeutics.—**Sulphur** is a valuable remedy in the treatment of this disease. It acts best when there is a feeling of burning and pressing in the vagina, with considerable excoriating leucorrhœa, pimples around the external parts, and itching of the clitoris.

Apis mellifica.—When there are eruptions and stinging as like a bee, now in one part and now in another, with fretfulness, and a burning spot near the left ovary.

Cantharides.—If there be burning and itching and at the same time frequent micturition, with cutting in the urethra as if the sides were torn apart.

Conium.—When there are indications that the ovaries are the prime factors of this trouble. Little pains in the ovarian regions, and an itching of the nipples at the same time. The itching of the vulva is like that caused by the bite of ants.

Graphites.—When the itching comes just before menstruation, and is associated with constipation; it seems to begin in the anus.

Nitric acid.—When there are swelling and burning and itching on the left side

of the nymphæ. Patient is dark and of hæmorrhagic diathesis;
night.

Mercurius.—When the disease is of specific origin, gonorrhœ

Consult also: *Calcarea carb.*, *Silicea*, *Coffea*, *Gelsemium*,

Abscess of the Labia.

Abscess of the labia often occurs as one of the co
pruritus. It is usually caused by an obstruction in Du
and from a closure of its duct. This should be opened
probe. If possible, we may press out the waxy accumu
prevent suppuration; but ordinarily the physician do
patient until an inflammatory action has set in; then re
had to poultices until the abscess breaks or is opene
Care must be taken in evacuating the pus not to c
downward, but to use a curved bistoury, letting the in
before backward. A dressing of *Calendula* may be
wound has been thoroughly cleansed with carbolized w

Arsenicum is a valuable remedy when the patient seems
abscess, when the pains are burning, and the discharge is saniou
fever is of a low type, and the face seems drawn and pinched.

Aconite.—When there is high fever, great restlessness, shoo
labia, and a red shining appearance of the swollen gland.

Belladonna.—The redness of the tumor seems to be in radi
bright red centre. The patient complains of headache, and is wea
over.

Hepar sulph.—When pus is forming; the patient complai
very irritable.

Phytolacca.—When the gland is hard, large, and very pain
given internally, and applied as compress to the vulva, often
abscess.

Vaginismus.

Synonyms.—Dyspareunia, Hyperæsthesia of the v
the sphincter vaginæ.

Definition.—An affection of the nerves of the mu
about the hymen and ostium vaginæ, which is char
cessive hyperæsthesia, often resulting in painful spas
ter. This spasm prevents the entrance of any object
since the least touch provokes a violent cramp of t
which the levator ani and adductors of the thigh ar
volved.

History.—Although this disease must have exist
antiquity, since hysterical complications have been
among women, no notice was taken of it until Dupuy
Burns, of Glasgow, described it and advised operati
the French surgeons notice the malady in their period

described it in 1868, and since that time all gynæcologists have recognized vaginismus as a distinct affection. Scanzoni calls it "neurosis of the vagina" which expresses itself by spasms, but the description he gives of this neurosis in his treatise on "Diseases of Women" seems to include more than the definition given above. The neurosis of the vagina, as described by Scanzoni, extends throughout its whole length, and the spasms recur without apparent exciting cause. In *vaginismus*, on the contrary, the constriction occurs only when the part is touched, and the spasm is limited to the pubio-coccygeus muscle.

Ætiology.—The causes of vaginismus are constitutional or local. Among the former are the hysterical diathesis and a scrofulous constitution which predispose to acrid catarrh. Locally the trouble may be due to inflammation of the vagina or vulva, inflammation of the meatus, or a polypus in the urethra, hæmorrhoids or fissures of the rectum, disproportionate size of the male organ, and excess in marital relations. Women who marry late in life are probably more liable to this affection, but it sometimes exists in girls, in which case it is apt to be associated with dysmenorrhœa. The fact that the disease is frequently noticed by modern authors is suggestive that perhaps the habits of civilization, conducing, as they do, to nervous diseases, make the modern woman more liable to this form of neurosis. The atony of the female genitalia, the aversion to the sexual act experienced by many women result, it seems to me, from a lack of physical exercise and at the same time an excess of mental labor. Neftel* suggested that lead poison from cosmetics occasionally produces vaginismus; however, there must have been in his case a tendency to hyperæsthesia of the genitals, else the nervous irritation would have been shown in some other part more decidedly than in the vagina.

Symptomatology.—In vaginismus there is pain on sexual intercourse; the slightest touch at the orifice causes a spasm. This spasm is produced by the action of the pubio-coccygeus muscle, which, Savage says, controls the orifice of the vagina. Associated with this discomfort, when the ostium vaginæ is touched, there is almost always spinal tenderness, sometimes in one part of the back and sometimes in another. There will be a slight nervous cough; and there is usually irritability of the bladder if by any chance the disease has any relation to a caruncle of the urethra. The hyperæsthesia in a virgin will be found exterior to the hymen, which is apt to be thicker than usual. In a married woman the remains of the hymen and the posterior wall of the vagina are most liable to irritation. Without the use of an anæsthetic it is often impossible for the physician to pass a finger or even to touch the parts. Not unfrequently the labia and ostium vaginæ are covered with a fine red-pointed eruption which may be either cause or effect, and this eruption once cured, the vaginismus will disappear. When the vaginismus is a pure neurosis, there will be great restlessness, the patient cannot sit long at a time, and the touch of the underclothing is not unlikely to cause a spasm. The clitoris may be sympathetically affected, and there is nearly always colorless urine.

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* Union Medical, 1869, No. 19.

Diagnosis.—Dr. Sims says, in his clinical notes on uterine surgery, that the "super-sensitiveness is diagnostic, the spasm pathognomonic," from which it is evident that while a diagnosis can be made without an examination of the parts, yet it will simplify matters if the physician is able to decide whether he is to deal merely with a nervous affection, or if the spasm is caused by the eruption before alluded to, or if the perinæum be unyielding. A physical examination, it seems, would render a mistake impossible, on account of the violent spasm felt upon the attempted introduction of the finger.

Prognosis.—The prognosis is favorable if the patient has not been worn out by long years of suffering before making complaint; even in such cases the vaginismus can be cured, and the chances are then in favor of returning health.

Treatment.—In considering the treatment, the practitioner must have clearly in view the parts of the organism affected by this malady. The shortest road to recovery, according to Sims, is to anæsthetize the patient, remove the hymen with scissors, and incise the perinæal body. "By means of a scalpel make a deep incision on the right of the mesial line, a small one on the left, the two uniting at the raphæ, and extend to the perinæal integument and through its upper border." A vaginal dilator should be worn at intervals during the day so long as the patient can endure the pain, this dilator to be kept in place by a **T** bandage. Ludlam advocates milder means. First he recommends the use of graduated bougies to overcome the disposition to spasms of the muscular fibre; he advises the use of a small instrument at first, which should be carefully anointed with an ointment of Belladonna and lard in the proportion of one to six, the patient to wear this as many hours a day as she can endure. The patient should avoid any exercise which tends to produce congestion of the pelvic organs, attempts at coition should be forbidden, and remedies selected adapted to each case. If the cause be uterine or vaginal disease, treatment must be directed to the cure of these ailments. If the vaginismus be symptomatic of general hysterical conditions with spinal irritation, the patient must have change of air, rich and healthy food, avoid all stimulants, and be diverted from the thought of herself. If the spasm is caused by caruncle of the meatus, relief will only come by removal of the offending tumor, and our knowledge of the new anæsthetic makes this a painless operation. Disease of the rectum must be met by proper means. As soon as it becomes possible to introduce the tube of a syringe, soothing injections should be used several times a day. Suppositories containing Belladonna, Gelsemium, or Hyoscyamus are occasionally of service. An ointment made of myrrh ʒj and vaseline ʒij has been serviceable in some of my own cases.

Arnica.—When the vaginismus is due to an injury to the parts from forcible or too frequent coition.

Aconite.—When the attack comes on with a chill, and this is succeeded by feverishness and great restlessness.

Cocculus.—The vaginismus is worse after menstruation. The patient quivers at the slightest touch.

Caulophyllum.—Excessively irritable vagina, with a spasmodic tendency, especially if there be aphthæ at the orifice, and a sticky leucorrhœa.

Lycopodium.—Itching, burning, gnawing in the vagina, violent dysuria during and after coition.

Gelsemium.—When vaginismus is associated with spinal irritation.

Thuja.—When the discharge of mucus from the urethra is excoriating; there is burning and smarting in the vagina when walking; great pain and burning in the rectum during stool.

PROLAPSUS VAGINÆ.

Definition.—A weakness of the walls of the vagina, resulting in an extension of the mucous membrane beyond the vaginal orifice.

Ætiology.—The relation of vaginal prolapse to prolapsus uteri has been a question in dispute among gynæcologists so far as it bears upon cause and effect. The relation of the pelvic viscera is such that the vaginal walls form one means of support for the superincumbent uterus, and naturally the displacement of either would affect both. The tendency of the vagina to hypertrophy during pregnancy, the dilatation of its muscular tissue at this period until the rugæ of the mucous membrane entirely disappear, and the failure oftentimes to perfect involution after parturition are most potent causes of prolapse of the vaginal walls.

The prolapse of the posterior wall is often associated with the descent of the anterior wall of the rectum. The presence of a rectal stricture, hæmorrhoids, or chronic constipation with straining at stool sometimes forms a pouch in the rectum which contains impacted fæces and drags down the vaginal wall, forming a tumor outside the labia called *rectocele.*

The same result may be brought about by a displacement of the posterior wall of the bladder which sometimes forms a pocket filled with urine; this dragging on the anterior wall of the vagina forms a fluctuating tumor called *cystocele.*

The laceration of the perinæum and undue extension of the vaginal sphincter are also factors in the production of vaginal prolapse.

This affection occurs often in old women, especially in those who have excess of adipose tissue in the abdomen. In fact, any condition which impairs the tonicity of the vaginal walls predisposes to prolapsus vaginæ, which may be acute or chronic. The former is exceedingly rare, and is caused by a sudden undue strain, and is only possible when the laxity of the vaginal walls predisposes to it. The chronic variety may last a lifetime.

Prognosis.—In acute cases of uncomplicated prolapse the prognosis is favorable to complete cure. In chronic cases the result depends upon the ætiology of the disease. Cases of long standing, especially if the patient is advanced in years, offer very little encouragement. When the vagina has been distended and stretched by frequent parturition, the only hope of cure lies in operative interference.

Treatment.—For acute prolapsus of the vagina rest in a horizontal position, replacement of the vagina, and the use of temporary supports, as a tampon of oakum, saturated with an astringent. If the case is not sufficiently severe to demand the tampon, the use of astringent and tonic injections is advisable.

Chronic prolapse of the vaginal walls without complication is best treated by a surgeon. The removal of the superfluous tissue results in a permanent cure of the difficulty.

If a ruptured perinæum is the cause of the trouble, the operation for lacerated perinæum must be performed. If displacement of the uterus presses down the vagina, the displacement must receive proper remedial measures.

Rectocele and cystocele should both be carefully evacuated, the one by catheter, the other by dilatation or removal of the stricture of the rectum, and dislodgment of the impacted fæces. After this is accomplished, properly adapted pessaries in the vagina, and the use of an abdominal supporter with a perinæal pad will do all that can be done without surgical interference.

Granular Vaginitis.

Synonym.—Papular vaginitis.

Definition.—The peculiar characteristic of this disease is an enlargement of the papillæ of the mucous membrane of the vagina and vulva. These papillæ are inflamed and feel, under the finger, like grains of sand.

Ætiology.—Granular vaginitis may follow as a sequence to simple vaginitis, may be produced by pregnancy, or may be the result of a sudden attack of cold. The latter cause is associated usually with a constitutional tendency to eruptive disease, and one might almost term this expression of the malady an eczema of the vagina.

Pathology.—In Thomas on *Diseases of Women* this variety of vaginitis is carefully described; Ludlam, too, alludes to it, but Scanzoni and West both deny its existence. The progress of the mucous membrane lining the vaginal canal and the vulva toward granular vaginitis is really a case of progressive hypertrophy of the follicles and papillæ.

The surface is at first congested and swollen, inflamed and dry; then follows enlargement of the papillæ which is appreciable to the touch; later, an exudation which produces one of the varieties of vaginal catarrh.

Symptoms.—The patient complains first of a sense of fulness in the vagina, with heat and dryness and some irritation. After a time the itching becomes intense, and the surface is so tender that the least rubbing to relieve this trouble causes a soreness. Sometimes there is an eruption upon the external parts.

When one of the accompaniments of pregnancy, this granular vaginitis may become so grave an affection, on account of the irritation which it causes to the nervous system, that abortion may result. Later a discharge makes its appearance, which is apt to be excoriating, and, unless great attention is paid to cleanliness, the disease extends sometimes quite to the inner surface of the thighs.

When the attack is acute and caused by cold, the patient should at once go to bed and apply vaginal douches of flaxseed tea and a decoction of hops and bran-water. I have used Plantago cerate with advantage in the vagina, and have had good results from an ointment composed of one part of Rhus to ten of vaseline.

Therapeutics.—**Apis mellifica.**—When there are white points on the papillæ, and the itching is not confined to one part, but attacks different places.

Lycopodium.—When the affection is associated with digestive disturbance, and the patient is troubled with constipation.

Pulsatilla.—If the granular vaginitis is associated with pregnancy, especially when gastric disturbances predominate.

Croton tiglium.—When the papillæ have a tendency to become vesicular and scab over after they are scratched.

SPECIFIC OR GONORRHŒAL VAGINITIS.

This variety involves the urethra, vagina, and vulva, and is caused by the absorption of the specific poison, the result of contact. The fact has been noticed that this type of vaginitis may be concealed for a long time in the Douglas cul-de-sac, but its extension is only a question of time. The symptomatology is nearly the same as in simple vaginitis; there are heat and burning, with profuse discharge, aching in the perinæum, dysuria, and, later, great soreness and rawness of the external parts. We may differentiate from simple vaginitis by the more intense character of urethral pain and by the fact of its inception directly after coition. There is danger of this morbid action passing up into the uterus causing an endometritis; or into the bladder where it excites cystitis; it also often leads to the formation of abscess in the labia. Buboes, and other specific affections, are likely to follow in well-marked cases, and extension of the inflammation into the Fallopian tubes is of not unusual occurrence.

Remedies.—**Aconite.**—In the beginning of the disease burning distress in the urethra; the urine passes drop by drop.

Cannabis sativa.—Cutting pain during micturition; violent sexual desire; swelling of the vagina; the orifice of the urethra is almost closed with pus, so that the urine is voided in a spray.

Cantharides.—The urine is mixed with blood; only a few drops pass at a time; great dysuria and vesical tenesmus.

Hepar sulphur.—Drops of white or yellowish pus with fetid smell, preceding and following the urine, especially when associated with leucorrhœa.

Sulphur.—Burning pain near the mouth of the urethra, constant tenesmus, stitching pain in the vagina and rectum.

Mercurius iodatus.—Is always to be thought of in specific troubles of all kinds, and is indicated by its characteristic symptoms.

Consult also the article on "Gonorrhœa" in a preceding section of this work.

DISEASES OF THE MAMMARY GLANDS.

Mastitis.

BY JULIA HOLMES SMITH, M.D.

Synonyms.—Mammitis, Abscess of the mammary glands, Inflammation of the breast.

Definition.—Inflammation of a part or the whole of the mammary gland, affecting its enveloping tissue or milk duct and sinuses; or involving the whole interstitial tissue, expressing itself by heat, redness, swelling, pain, and suppuration.

Ætiology.—The causes of mastitis during puerperium are: 1st, those which rest with the mother; 2d, those dependent upon the child; 3d, such as are connected with the general health. The first mentioned may be (a) constitutional or (b) local. (a) Diseases which have impoverished the system, tuberculosis, syphilis, marked anæmia, chlorotic condition causing considerable inflammation after slight exposure to cold, chronic diarrhœa, over-work, deficient supply of nourishing food, all cause a predisposition to mammary troubles. Plethora may also tend to produce local disturbances, owing to the great amount of adipose tissue pressing upon the lobules; the calibre of the milk-ducts is lessened, a condition of stasis results, and unless the milk is removed promptly, an abscess is caused. In many young women the mammæ are imperfectly developed, the errors of the nursery causing suffering in the lying-in room. Mothers and nurses who pin the bands of their children's clothes too tightly, thus pressing upon the newly forming breasts, render the possibility of trouble in new maternity very likely. Another custom which cannot be too much deprecated is the one which nurses have of squeezing the milk out of the breasts of a new-born babe, thus causing adhesions which must be broken when the rush of milk comes to supply the next generation. In women who have borne many children there is sometimes an atrophied condition of the milk-ducts, the calibre seeming to have become too narrow to allow the exit of the fluid. (b) The most common local causes are shrunken or depressed nipples. To remedy this condition many unwise expedients are employed; and if the prominence of the nipple is satisfactorily accomplished, it is only after such severe physical suffering that the mother is in a nervous state bordering upon fever. Laceration of the nipple, making the nursing of the child so painful that the mother yields to her own desire for ease, and so does not succeed in emptying the breast of the accumulation, causes an abscess.

There may be occlusion of the milk-ducts, either from bending of the duct caused by pressure, as before alluded to, or retention of the secretion long enough to have it become dry and form a desiccated clot.

Sometimes a simple catarrhal inflammation, the result of cold, will by extension to the membrane lining the ducts so narrow the passage that, although the functional activity of the gland is continued and the milk is secreted, it finds too small an outlet, and this condition almost certainly produces parenchymatous inflammation. The milk retained for some time is changed and has an acid reaction, and when allowed to escape irritates both ducts and nipples.

The causes in the child which tend to produce mastitis are the inability of the infant to take all the milk secreted, or the presence of an aphthous sore in the mouth, both of which conditions prevent effective nursing on part of the babe. The death of the child, leaving open the way to incomplete emptying of the breast, may become an ætiological factor.

Carelessness in attention to the nipples not unfrequently results in mastitis; milk is left to sour and dry upon them, and sometimes even the lochial discharge comes in contact with the nipple and, in case of abrasion, acts as a poison. The use of the breast-pump has been frequently the cause of mastitis by wounding the delicate ducts, and sometimes the eagerness of the child for its food causes it to push against the breast and so do injury; a very slight blow when the mammæ are distended is often sufficient to cause inflammation.

Pathology.—In the subcutaneous variety the formation of the abscesses corresponds with the ordinary boil in any other location. The connective tissue is composed of fat, and if the inflammation is confined to this structure, the milk lobules and ducts are not seriously affected, and nursing may be continued. When, however, the parenchyma becomes involved from any of the causes previously mentioned, especially those of obstruction, the secretion changes to acid, the sinuses become dilated, causing active inflammation there, the bloodvessels are enlarged, and the entire breast swells and becomes hard and painful. If the inflammation is not aborted, but proceeds to suppuration,

a succession of abscesses is very common from separat
ferent lobules, and portions of the glands may slough a
the intense inflammatory processes. If an abscess br
cannot discharge freely, the pus burrows its way into t
tissue, sometimes through large milk-ducts, and from th
come a constant oozing of milk mingled with pus, a c
difficult to overcome until the cessation of lactation. F
lined with this pyogenic membrane are obstinately ch
woman's strength is drained to its lowest ebb. Bloodve
sionally eroded, and fatal hæmorrhages may occur. In
ular abscess the entire areolar tissue is affected, and the q
secreted is enormous. These abscesses sometimes bur
towards the ribs, causing inflammation of the muscular
sionally the pus finds its way to the surface, appeari
glance like a subcutaneous variety; a little care will, ho
a mistake, as the accumulation beneath the skin pus
directly forward. The skin looks tense and slightly
narily, but sometimes it has a very dark color, or th
creamy whiteness and prominence of the veins. A di
milk-ducts may, from prolonged retention, become pe
tended, causing galactocele.

Symptomatology.—Inflammation of the gland
usually ushered in by intense pain, great local tendern
and high temperature. The pain is so great that rest
possible. If the inflammation be but partial, not invo
breast, nodular enlargement may follow. If diffuse, t
is like an irregular mass of nodules, which are painful t
each nodule becomes a focus of inflammation.

In this variety occurs the greatest œdema, and when
there is a doughy feeling, but its location is often quite
cover because the pus is so deep-seated. In the subgl
the pain is more heavy and greatly increased by m
The breast is pushed forward, and may be moved as
watery bed. There is most acute hyperæsthesia of t
discoloration is very slight, generally of a reddish hue,
white, the veins appearing prominently. In the sub
the symptoms are much milder. There are local hea
ness, slight chills, and fever. There is severe pain in
times unendurable; the tongue is coated white; ano
nausea exist; the bowels are constipated, and the ar
of the affected side are very painful; general weariness a
are usually present.

Varieties.—1st. Subcutaneous or supra-glandular
or parenchymatous. 3d. Subglandular.

Diagnosis.—The differential diagnosis is of great i cially in deciding as to the place and method of making an incision after pus is suspected. The subcutaneous variety is unmistakably known. The parenchymatous is known by the intense pain and suffering, and the adhesions occasionally formed. The subglandular variety may be recognized by the great protrusion of the entire breast, the agonizing pain when the arm is moved, the fluctuation produced by inserting the finger-tips around the circumference of the gland, or by the sensation of floating imparted to the fingers when trying to move the breast.

An inflammation may be diagnosticated from the caking or milk engorgement, by the circumscribed hardness and the pain on pressure which is common to inflammation. When the swelling is due simply to the retained secretion, the whole breast is more uniformly increased in size, and the signs of local or constitutional disturbances come on slowly, if at all, since these are only caused by an irritation due to the distended condition.

Mammitis is also to be distinguished from tumors of the breast which may have existed previously and escaped observation. Having first attracted attention during the puerperal state, such a growth may be mistaken for an inflammatory nodule, but the absence of heat and pain and the continued free flow of milk will enable us to discriminate from the latter.

Prognosis.—This depends largely upon the state of the general health. If the woman be in good condition, the mammary affection the result of local causes, such as fissured nipples or constant chilling of the breast, under careful treatment the inflammation may be checked in a few days. But if the system be in an anæmic state, the digestive organs disturbed, the patient's surroundings of an unhealthful nature, suppuration becomes almost inevitable and may run a very tedious course. There is not, ordinarily, cause for alarm; death sometimes results from septicæmia caused by the absorption of pus; in cases occurring among women of the poorer classes the breasts sometimes become a mass of abscesses, and the system being unable to stand the drain, the patient wastes away as in tuberculosis.

In mastitis of the non-puerperal state the prognosis depends upon the state of the general health and almost the same conditions as those relating to the puerperal woman.

Treatment.—Preventive treatment should receive careful attention. All pressure upon the mammary glands should be avoided from earliest infancy. The use of high-cut stays with stiff bones cannot be too strongly deprecated. A constant use of cold water sprays upon the breasts assists in their development and hardening. No false modesty should prevent a mother from carefully instructing her daughter as to the use of these glands and the care necessary to keep them in a perfectly healthy condition during pregnancy. Gentle massage may be practiced by the woman herself, rolling the breasts forward between the hands, and drawing the nipples forward in as close imitation as possible of nursing. This will do much toward hardening and preparing the glands for the vigorous attacks of a hungry baby. The old fashion of applying astringents, such as tannin and glycerine, is to be deprecated. It toughens the surface, but while it overcomes undue sensitiveness, it clogs the orifice of the milk ducts at the nipple, bringing about the very obstruction which is sought to be avoided.

The child should be put to the breast as soon after labor as possible, for the action of the child's mouth determines the flow of the blood to the gland, and prepares it for the work of secretion. Besides, the close relation of the mammæ and uterus makes lactation a very valuable factor in producing involution, and very often putting the child to the breast will produce uterine contractions, and so control hæmorrhage.

Too much cannot be said in favor of nursing the child at regular intervals. Too frequent and irregular nursing keeps up glandular irritation tending toward inflammation, as a perpetual dragging at the nipples may lacerate them. The indifferent mother who empties the breast at too long intervals may cause mischief from overdistension of the milk ducts and sinuses. The tiniest fissure should receive careful attention, the child applied to the healthy breast, and the tender nipple covered with a shield. Touching the fissure with nitrate of silver, using a camel's hair-brush, has been found useful. Covering the crack with compound tincture of benzoin or collodion is also good. If the fissures are too severe for the child to use, even with a shield, the infant should be made to take the bottle for a few days or until the fissures are healed, the milk meanwhile being expressed by massage. With the first appearance of caking or inflammation, an [illegible] and gentle [illegible] or pressure to stop the flow of milk should be tried. If the flow of milk be excessive, a little camphor may be rubbed into the gland, or a plaster made of lard and camphor put over the whole breast. Again, to prevent the usual amount of secretion and to lessen the blood-supply for a time, compression should be made. A circular elastic adhesive plaster with an opening for the nipple exerts an equal pressure and frequently acts promptly. If it is desired to use an anodyne lotion, a breast-sponge may be applied, moistened with the lotion, until sufficient to make a decided pressure. To prevent the sponge from becoming so hot as to act like a poultice, an ice-bag may be laid above it outside the bandage (Gaunt). Should signs of inflammation still continue, the secretion of milk must be reduced to a minimum, and for this purpose Gaunt recommends an inunction of the Iodide of lead, to be used three or four times a day. In the intervals the sponge moistened with a weak lead lotion with ice may be used constantly. Poultices are to be avoided, except in the subcutaneous variety, as they soften the breast, and by determining the blood to the part increase rather than diminish glandular activity. Ground flaxseed, makes the best poultice when such applications are necessary. Spongio-piline is also good if the tenderness be very circumscribed. A compress of hot laudanum soothes and acts as a poultice.

Phytolacca (milkweed) as a lotion, or the leaves used as a poultice, is excellent for aborting inflammation, and should be tried before proceeding to the more vigorous treatment of the ice-bag and lead ointment. When suppuration has become inevitable, the abscess must be opened. Before and after this operation the parts should be bathed with a carbolic acid solution. A dressing of absorbent cotton, or very fine oakum, or of *fuller's earth*, is to be recommended. The breasts should be supported with a suspensory bandage passing around the neck under one arm and over the other.

In chronic cases where the gland is fairly honeycombed by abscesses, the parts must be stimulated by injections of Iodine tincture, or of a solution of Chloride of zinc, or of Nitrate of silver, and graduated compression kept up. Labarraque's solution, one part in eight or ten of water, injected twice a day, is highly recommended by Jacobi as a simple lotion.

If hæmorrhage occurs, and cannot be controlled by hot water or other styptics, the arteries should be found and ligated. To counteract the drain upon the system, the most nourishing food must be given, and stimulants in moderate quantities may be allowed.

Therapeutics.—**Aconite.**—Mastitis caused by chill; anxiety, fear, characteristic restlessness and thirst.

Belladonna.—Breasts feel heavy. Red streaks running like radii from a central point. Scanty urine and headache.

Bryonia.—Heat. Hard, painful, heavy breasts; stitching pain; patient cannot sit up; worse on motion; stitching pain in the ovaries. Suppression of milk.

Graphites.—Mastitis recurring frequently. Abscess in the breast; in women who suffer from eczema.

Hepar sulphur.—When suppuration seems inevitable and the pain is pulsative.

Mercurius iodatus.—Hard swelling of the breasts; rigors; the baby refuses the breast; the milk looks impure, is yellow and thin.

Phosphorus.—Phlegmonous inflammation. Hard lumps in different places; the discharge is watery and offensive; patient has night-sweats.

Phytolacca.—Very useful for indurated breasts. As soon as the milk comes the mammæ seem hard. A most valuable remedy.

Silicea.—When the abscess burrows, forming fistulæ.

Veratrum viride.—When there is great nervous irritability.

Conium has a specific action on the breast, dissipating its engorgement and relieving the pains, especially when there seems to be sympathetic irritation in the ovaries. This remedy is also valuable in the lumps that form in the breasts of young girls, just before the appearance of the menstrual flow.

HYPERTROPHY OF THE MAMMARY GLANDS.

Hypertrophy of the breast may result from excessive development of the glandular or of the adipose tissue.

The swelling sometimes appears in both breasts at the same time, and sometimes with or without febrile disturbances, and with or without pain.

(a) *Glandular Hypertrophy.*

Definition.—An enlargement of one or more of the lobes of the breast which is never associated with febrile disturbances.

Ætiology.—This is obscure. When these hypertrophied lobules are found, as they most frequently are, in unmarried or sterile women, the condition may be traced to that incomprehensible nervous intimacy existing between the sexual organs and the mammary glands. Menstruation is often preceded by a pain in the breast and by the presence of nodules which are hard and slightly painful on pressure and entirely movable. It seems sometimes sympathetic with turgescence in the ovary. Hypertrophy may also result from sudden cold, or from an extension of disturbance in the axillary glands. The scrofulous diathesis predisposes to this disease.

Diagnosis.—The diagnosis at times is somewhat difficult. It is important to differentiate hypertrophy from an adenoid tumor or sarcomatous growth. In simple hypertrophy the greatest size is reached just at the menstrual period, and this fact aids in the decision. In hypertrophy there is no pain, simply a feeling of weight and fulness.

Therapeutics.—*Conium*, *Silicea*, *Phytolacca*, *Calcarea carb.*, and *Thuja* should be carefully studied, and used as they are indicated.

MASTODYNIA.

Synonym.—Neuralgia of the mammary glands.

Definition.—There may be simply neuralgia or hyperæsthesia of the skin of the breast, the slightest touch causing pain. Often the motion of the arm gives the sensation as if the breast were being torn from its capsule. It may also affect the deeper structures of the breast, in which case the disease resembles intercostal neuralgia, with which it is often confounded. It may also have its seat in an affection of the spine in the dorsal region, because the nerve supply of the mammary glands is derived principally from the intercostal nerves.

The **Ætiology** is obscure. It is difficult to point to the exact part of the organism which is at fault. Chlorosis, anæmia, and hysteria are constitutional conditions which may cause neuralgia in any part of the body, and associated, as these maladies usually are, with disturbance of the sexual organism, it seems not unlikely that the mammary gland would sympathize.

There are sometimes small points on the glands which are sensitive to pressure, and often the patient thinks she is developing a tumor. This is probably simple enlargement of the nerve-fibre.

Symptomatology.—There is pain of all possible varieties, boring, grinding, lancinating nearly through to the shoulder and then down to the arm, without tumefaction and without discoloration, except in rare instances when the neuralgia is superficial and the pressure of the finger makes a red spot on the gland, which spot does not disappear for some little time. The pain is apt to be worse during the catamenia. It has no special relation to lactation.

Treatment.—This should be directed to the constitutional dyscrasia which causes the disease; if the patient is anæmic, the removal of this condition will be followed by a prompt cure of the neuralgia. Hot applications relieve the paroxysms of pain; and if necessary, a chloroform liniment may be used. It is well to spray the breasts with cold water twice a day, and then to employ friction until the surface is quite in a glow.

An inunction of the breast with oil and quinine is valuable when the neuralgia in the breast alternates with neuralgia in other parts of the body, and seems to be periodic.

Therapeutics. —**Aconite.**—When there is great nervous irritation and restlessness, especially in young girls.

Pulsatilla.—When associated with characteristic menstrual derangement.

Bryonia.—When complicated with ovaritis, and when movement of the arm is painful.

Arsenicum.—When the pain is relieved by heat and is aggravated by repose or cold.

Chamomilla.—When there is hot perspiration under the breasts.

Rhus seems best suited for hyperæmia of the mammæ. The breasts ache deep in, and feel hot and dry, and are relieved by manipulation.

Ignatia.—When the neuralgia is aggravated by mental emotion, and the patient is fretful.

Ferrum for anæmic conditions.

Chininum arsen.—When there are malarial complications and the mastodynia takes the place of a recurrent ague.

Cancer of the Breast.

BY G. A. HALL, M.D.

Frequency.—Cancer assumes a prominent place in the diseases of the breast, because of the frequency with which this malignant trouble attacks the female mammæ. Of 200 consecutive cases which came under my observation, 56 per cent. were found in the breast. Of 268 cases noticed by Munn, at the out-patient's cancer-department in Middlesex Hospital, there were 157 of the breast and 47 of the uterus,

the remainder being distributed in different portions of
the total number, 58 per cent. were found in the br
cases reported by the same observer, there were 260 of t
389 of the uterus, the large proportion of the cases
being due to the fact that the patients suffering with
uterus were unable to pursue their vocation for so lo
time as those suffering with cancer of the breast.

According to the statistics of cancer, by William Ba
Paget reports 500 cases, in which 276 were of the brea
to Mr. Sibley, of 520 cases 192 were found in the bre
reports of different observers find a varying frequency
proportion of cancer of the breast, the statistics are su
the great liability of this organ to cancerous disease.

They do not accurately represent the number of car
for the term cancer, as used by Munn and other Engli
synonymous with malignant, including both sarcoma
They are, however, approximately correct, for the nu
matous tumors of the breast is comparatively small
frequency of the two forms can be judged by the rec
of malignant disease, of which 446 were carcinomato
sarcomatous.

The proportion of carcinomatous disease of the m
fore practically as represented by the statistics of my
tinental observers.

Definition.—The term cancer, as here used, applies
as, according to the anatomical classification, are ter
and are made up of imperfect epithelial new format
ally they consist of a fibrous stroma or framework, th
which are filled with solid plugs of atypical, epithelia

The tumor commences by an enlargement and ag
cells of the acini, with an infiltration of cells into the
ing; as the cells continue to increase and enlarge, th
in size, thus forming large nodulated masses. Thes
rounded by an infiltrated connective tissue.

Ætiology.—The various causes which may be at
this abnormal growth are rather obscure. Different o
different reasons to account for this unusual formatio

Inasmuch as the line of treatment depends entirel
held considering the origin of cancer, the considerat
is most important. Two entirely distinct views are
the *constitutional* and the *local*. The former claims that
the breast is the local expression of some general
either in the blood or in the tissue at large; the latte
origin in the breast as the result of local disturbance,
normal in character and free from morbid material.

Without the presentation of any reason for the belief in the constitutional origin of the disease, I will merely state that I hold strongly to the belief in the local origin of cancer of the mammæ.

While admitting the fact of heredity, which to my mind is the strongest argument in favor of its constitutional origin, I cannot but regard this inheritance as simply the transmission of a predisposition to a local disease, just as occurs in the heredity of sebaceous tumors or cysts. An exciting cause being present, the tumor is produced more easily in those predisposed, and less so in those who have not this inherited tendency.

That irritation or injury is the cause of the derangement of the local nutritive cells, seems evident. Sir James Paget has called attention to a peculiar eczema or psoriasis of the nipple or areola which is often one of the precursors of carcinoma. In these cases, as first noticed by Paget, the areola was the seat of an intensely red, raw surface, discharging a copious, clear, yellowish, viscid fluid, attended with itching or burning sensations, as seen in ordinary chronic eczema; in others the nipple was dry, as seen in psoriasis.

For the purpose of determining the relationship between these skin-affections and carcinoma, Mr. Butlin examined two cases in which the nipples were attacked with eczematous disease. In each instance the ducts were open and contained masses of squamous epithelium. In an induration of one of the breasts the acini were enlarged and filled with epithelium. Here was a morbid process which is similar to that present in a carcinomatous growth. In two instances in which scirrhus had followed this exanthematous condition, the tissues outside of the neoplasm, which were somewhat indurated, had an appearance similar to that before described, with the addition of cell-nests and of much greater enlargement of the acini and ducts in the centre of the carcinoma than in the previous cases, in that they had become confluent and their contents had made their way into surrounding tissue. It is probable then that the long-continued irritation of eczema or psoriasis is sufficient to produce carcinoma. A history of puerperal mastitis is found in many cases of cancer of the breast. In such cases a circumscribed, contracted induration, consisting of glandular, surrounded by cicatricial, connective tissue is found. This condition is very similar to that found during the retrogression of the breasts when their functional activity ceases. It seems possible then that at some subsequent lactation, or when the menopause arrives and the natural changes in the gland occur, the natural action of the cells should be changed, and instead of producing normal tissue should only succeed in forming atypical or imperfect cells. According to Gross, of 365 women who had borne children, in 71 there was antecedent mastitis, but in only 30 did an induration remain from which cancer originated. The percentage therefore is small in which the origin could be ascribed to a local inflammatory condition, and yet it amounted to over 8 per cent. of the cases tabulated. It is difficult to determine the exact influence which injury may hold in the production of those changes which result in cancer. In many cases the injury is so remote from the development that the patient forgets the occurrence. It is not unfrequent, however, to have such a history related. A woman, 46 years of age, previously healthy, struck her breast against the bedpost, causing severe pain. The indications of a tumor developed rapidly, but so acute were the symptoms that it was supposed to be merely an inflammatory condition. In six weeks it had involved the whole gland and was removed. Six months later the patient died from recurrent growths. From 100 cases coming under my own observation, 23 gave a history of previous injury.

Forms of Cancer.—Any of the forms of cancer may occur in the breast, but the scirrhous, known also by the name of fibrous, the atrophying, cicatrizing or hard cancer is most common. The encephaloma, known also as the medullary, cerebriform, or acute cancer, stands next in frequency. The colloid or gelatinous cancer is very unfrequent. Epithelioma is seldom seen. But three cases of epithelioma of the mammary gland have ever come under my observation. Melanotic cancer is almost unknown. Fully 80 per cent. of all the carcinomatous tumors found in the breast are scirrhous cancer. This is the form of cancer which was known to the ancients, and is in many respects the perfect type of carcinoma. It may take many forms, but in every instance is an infiltration into the gland itself. The cancerous tissue is very compact, and while diseased in one part of the gland, the remainder, to all appearances, is healthy.

According to the condition of the patient, the gland may be withered or surrounded by an excess of fat. As is signified by one of its many appellations, it is often very firm and hard, having more resemblance to a fibrous, than to any other, tumor. Even this condition may be more or less modified by the rapidity of the growth. The tumor does not grow to a large size, even when the whole gland is involved, being less than the normal size of the gland.

Scirrhous cancer creaks under the knife, has a bluish-gray lustre, and cuts like cartilage. In appearance it resembles very much the tissues of fibroma, but upon scraping the cut surface of the carcinoma there is given out a milky white fluid, called by the older pathologists "cancer juice" and by them considered one of the principal diagnostic signs.

Medullary cancer is less compact in form than the scirrhous, and is more apt to spread by contiguity to the adjacent tissues. Instead of contracting the mammary tissue as by cicatrization, it develops and enlarges it by its own cellular elements. It is soft, elastic, semifluid, and made up of a grayish-white base mottled with pink, is very vascular, and on being cut, little spaces may be found filled with blood.

The colloid tumor, as a rule, is as hard as an ordinary scirrhus, and seldom attains a very large size. It has a yellowish-grayish or white surface, and may be hard and soft in different places.

Age.—Cancer of the breast never develops before puberty, and is very rare until after 30 years of age. Only one or two cases developing before that time have come under my observation.

Of 276 cases reported by Paget—

5	occurred between	20 and 30
41	" "	30 " 40
122	" "	40 " 50
65	" "	50 " 60
55	" "	60 " 70
8	" "	70 " 80

Of 640 cases, 410 occurred between the ages of 40 and 60 years, the average age being 48 years. Although the preponderance of cases shows the development of cancer at the age when certain changes in the reproductive organs are prone to take place, there does not seem to be as close a connection between the two conditions as the statistics appear to indicate.

My own observation leads me to believe that as many cases develop after the cessation of menstruation as before. Of 289 cases in which this condition was observed, 142 were menstruating, and continued to menstruate for some time after the appearance of the tumor. While these facts prove the liability of cancer at that age, it is not so easy to trace the cause to the change in the reproductive system. The development seems to be due more to the general failure in the process of nutrition than to any irregularity in the reproductive function, for, of the cases enumerated, in only 7 per cent. was there any such irregularity. The influence of marriage has been shown by Mr. Baker in his reports; in a table of 260 cases there were:

Married,	72 per cent.
Single,	23 per cent.

According to this report, the percentage of single women was less than in women generally. Previous ill health seems to exert little influence, for in more than two-thirds of the cases examined the patients had been in good health until the commencement of the formation of tumors, and of the remaining one-half, more than one-half were in moderately good health.

Location.—Certain portions of the gland seem to be more frequently attacked than others. Of 236 cases, 86 were found in the upper and outer quadrant; 12 immediately behind the nipple, and the remainder in other portions of the gland. In nearly all instances the tumor is situated nearer the nipple than the periphery of the gland.

Size.—The carcinomatous tumor of the mamma does not attain a large size unless it is of the medullary character. The ordinary scirrhus is smaller than the gland itself, even when the whole organ is involved, and rarely attains the size of a large apple; in the atrophying scirrhus the gland is decreased in size, the whole tumor, in many instances, being no larger than a crab-apple. The medullary cancer is larger than the other forms, but never reaches the size of many benign tumors.

Growth.—The growth or progress of the tumor is rapid but uniform. When the tumor develops early in life the growth is more rapid than when occurring after the change of life, and is more liable to be of the medullary character. When it appears during lactation or pregnancy, instead of remaining quiescent, as in certain troubles of similar character, its growth is wonderfully rapid. In a case of this kind but eight weeks elapsed from the commencement of the tumor until it had involved the whole gland. This rapid increase of growth is probably due to the large supply of blood sent to this gland during its period of greatest activity. This view accords with the oft-noticed fact that robust, well-nourished persons succumb more rapidly to the disease than the aged and withered.

In old, lean, withered women the cancer seems to share the prevailing atrophy, and remains quiescent for several years, or even decreases in size. This condition may remain, even if ulceration has taken place, and thus lead the patient to believe in its ultimate cure. The mode of extension of the tumor seems to be by the addition of cells to the surface of the existing mass and the infiltration of the tissue immediately surrounding it.

This tissue is directly connected with the original tumor, at least it is very unusual to find one mass separated from another.

The distance at which the cancerous infiltration may exist from the original mass is somewhat in doubt. By some it is believed to exist only a few lines from the apparent boundary of the tumor. I am inclined to believe, from clinical indications, that the area of infiltration exists some distance from the apparent boundary. As it extends, the new tissue seems to cicatrize, drawing the tissue of which it is composed into a smaller mass.

This tendency to contract produces often a peculiar dimpling of the surface of the breast, due to the shortening of the superficial mammary fascia which separates the ducts of the gland and is attached to the under surface of the integument. The cicatrizing tendency of the tumor, as it grows and involves the skin, is shown in its effect upon the nipple. This portion of the breast is composed of erectile tissue, and normally is prominent and free. As it becomes involved in the extension of the disease, it becomes permanently drawn down or retracted by the contraction of the fascia and the shortening of the milk ducts which terminate in it.

This is true only in the cases in which the entire gland is involved or in which the disease is situated near or behind the nipple. Probably in more than half the cases this condition is present, and particularly so in the scirrhous form of the disease. In all instances depression is due to contraction, and not to the burying of the nipple by a growth extending above it.

Ulceration.—Ulceration is an inevitable result in cancer of the breast if the disease is left to the unaided process of nature. It may be accelerated or delayed, according to the constitutional idiosyncrasies of the patient or according to the amount of irritation to which it is subjected. This ulceration may commence in the substance of the growth and extend toward the outer surface, or it may commence in the integument and make its way inward. The latter form is the more common in scirrhous cancer, which grows slowly.

As the tumor grows, the skin becomes adherent to it, infiltrated with cancerous matter, and then tense and glossy. The discolored skin soon becomes traversed by a fissure or crack, which looks red and irritated, and is early covered with a scab. After a time the crack widens out into a more pronounced ulcer, the scab disappears, and an acrid discharge covers the surface. This ulceration does not deter the further involvement of the gland, the growth continuing to grow more rapidly than ever before.

The cancerous mass which is shown by the destruction of the integument does not become fungous, nor does it seem to take on the ulcerative action. Granulations, similar to ordinary granulations, may be seen, but are usually more pale, and never go on to healthy formations. Ulceration which commences in the substance of the gland presents a somewhat different appearance. In such cases, upon destruction of the integument, a cavity is seen, similiar to that found upon the opening of an abscess, but a softened, disintegrated cancerous mass forms the walls, and a dull, grayish material, consisting of degenerated cancer-cells, broken-down tissue, and unhealthy pus, fills the cavity of the sac. As this matter is discharged, a deep excavated cavity is left. The ulceration, once commenced, continues, and the cavity enlarges by the destruction of the walls and the edges of the opening; but the tumor is not destroyed, for it increases at a greater rate of speed than the ulceration, extending to the subglandular tissue, the fascia of the muscles, or even the costal bones outward beyond the middle line of the chest, or downward until the whole surrounding surface is infected. It is this infiltration of the pectoral fascia which so firmly fastens the tumor and produces that condition of immobility so characteristic of mammary cancer.

The time at which ulceration makes its appearance differs, as has been said, in different individuals and in the different forms. It may be present as early as the sixth month, and may not occur until several years have elapsed. The average time in my own cases has been about eighteen months.

Lymphatic Involvement.—Involvement of the axillary glands in the cancerous disease of the mamma is only a question of time. A most intimate connection exists between the mammary and axillary glands, a chain of glands extending along the border of the pectoral major as far as the mammary gland, and receiving from it the lymphatic vessels. The cancer-cells have therefore an easy and natural passage from the mamma to the axillary lymphatics. Once located, they grow and become new foci of disease, similar in character to the parent growth.

Like the parent growth, they have the same tendency to infiltrate, contaminate, and finally take to themselves all the neighboring tissue. In some instances the glands become enlarged and remain free and distinct, but in many others they become welded together into one great mass, filling up the axilla, surrounding the arteries, veins, and nerves, and seriously interfering with the natural functions of the part.

As the same connection exists between the axillary and infra-scapular, the axillary and infra-clavicular glands which exists between the mamma and axillary, these latter glands may serve as foci of infection for both the infra-scapular and infra-clavicular glands.

When the lymphatics become filled with the cancerous disease the cells soon reach the circulatory system, by the way of the thoracic duct, and once there, they may be transported to any part of the system.

Metastatic Deposits. — These deposits, although ordinarily taking place in the order mentioned, may be present without any apparent axillary infection. When a secondary cancerous disease is developed in a part remote from the axilla, its seat is most frequently the liver, then the pleura, and finally the lungs.

The frequency of this secondary deposit is most difficult to determine on account of the limited opportunity which is afforded for post-mortem examinations. In the few instances in which examinations have been allowed my suspicions have been realized, the viscera being found implicated in more than half the cases.

Pain.—The pain in cancer of the breast is less severe than that of cancer in other localities in which the tissue is firmer and more compact. In some of the most aggravated cases, from the formation of the first nodule to the entire involvement of the breast and axillary glands, there has been no pain, while in others from the incipiency, even before the first induration made its appearance, the pain was irritating, sharp, cutting, agonizing. These, however, are exceptions; usually the following is the condition: For the first year the tumor is painless, or the seat of occasional sharp pains. After that time the tumor becomes more and more painful as the disease extends, until, when ulceration takes place, it is quite severe. The pain may be increased by damp weather, by cold, by the menstrual period, by over-exertion, or by fits of anger or depression, in fact by any circumstance which is productive of neuralgia in the non-carcinomatous patient.

Cachexia.—As the disease advances locally and by metastasis, the general disorder increases and the cancerous cachexia is established. This condition, which is a general failure of all the powers, is similar to the same condition found in phthisis and other diseases which are accompanied by profuse discharges, systemic infection, and loss of blood. It seems to be due to one of two conditions, the intensity of the local disease and the effect produced by pain, discharge and hæmorrhage, or to the implication of important viscera by metastasis.

Duration.—The duration of cancer of the breast differs much in individual cases and in the different forms of the disease. It is modified much by the line of treatment pursued. Of 100 cases of which I have a record, and in which no operation was performed, the average time from the first appearance until the death of the patient was three years and one month. This includes one case of only nine months' duration, and three in which five years elapsed from the recognition of a tumor until the termination in death; it does not include several cases in which the tumor had existed for a number of years and which, in my estimation, were not cancerous during their early life.

A tumor originally benign may take on malignant disease, even as normal tissue may become carcinomatous, and I believe with much more reason.

The adenoma consists of epithelial tissue very similar to normal gland-tissue, but it is not perfect normal tissue, it is a slight retrogression from perfect tissue. If, then, normal tissue may at a certain age in life, when the conditions are most favorable, take on carcinomatous action, it is not improbable that an adenoma, possessed, as it is, of even less perfect formations than the mammary gland itself, may be subject to the same disease when the general failure of power consequent upon the change of life takes place.

Tumors, then, that have existed for many years before showing any signs of malignancy are hardly to be considered when determining the general duration of carcinoma of the breast.

Symptoms.—All the forms of carcinoma have the general physi-

[illegible] form, like [illegible] peculiari- [illegible] nly com- [illegible] forms is [illegible]

[illegible] patient [illegible] of the [illegible] tumor is [illegible] lered of [illegible] or more, [illegible]

[illegible] parox- [illegible] nating, [illegible] have [illegible] n were [illegible] mastitis [illegible] there is [illegible] pain is [illegible] breast. [illegible] The pain [illegible]

[illegible] months it [illegible] tissues, [illegible] the sur- [illegible] tinues, it [illegible] llaries [illegible] hue to [illegible] in its [illegible] peculiar [illegible] and erect, [illegible] becomes [illegible] tissue. [illegible] respond- [illegible]

[illegible] the mass has extended [illegible]ward, attaching itself to the [illegible] pectoral muscle. The tumor and the gland form one [illegible] firmly anchored to the anterior portion of the chest and not [illegible] under the integument. Little lymphatic nodules are now [illegible] in a direct line from the gland to the axilla, forming a contin- [illegible] nodular path. The pain becomes increased in severity, [illegible] longer confined [illegible] east, but extends down the arm and [illegible] the cervical re [illegible] disease pro [illegible] r masses are found in the neck. [illegible] the forear [illegible] l may become œdematous. Up to [illegible] patie [illegible] lth has been uniformly good, and she has been cheerful and hopeful of ultimate cure. Now her strength begins to fail, she becomes despondent, and she is obliged to remain a large portion of the time in her room or in bed. Constitutional involvement has commenced.

In the further progress of the disease the digestive functions become impaired; assimilation, excretion, and secretion are imperfect; the expression of the countenance becomes changed, showing a mingling of anxiety, distress, sorrow, and suffering; the eye loses its pleasant expression, becomes dull or restless, and the skin assumes a yellowish or leaden hue, and is drawn like parchment over the emaciated features. The lips become dry, the tongue coated, and the patient is annoyed with constant thirst. In the meantime changes have taken place in the tumor. Over its most prominent part the integument becomes thinner, and is changed to a reddish hue. A little vesicle forms upon the surface around which the tissue has become softer, giving a distinct sense of fluctuation. The vesicle breaks and an ulcer is formed, with bold or everted edges. The base is covered with a gangrenous tissue, discharging a thin, ichorous fluid. This discharge gives off the most pungent, penetrating and disagreeable odor. As the work of ulceration progresses, hæmorrhage is a frequent complication.

Simultaneous with the advent of ulceration all the symptoms increase; the nights of the patient become sleepless; the days a continuous torment; her strength fails rapidly; the patient prays only for relief in death, which usually takes place in about three years from the discovery of the growth.

Occasionally there is noticed, as one of the earlier symptoms of the disease, a discharge from the nipple, at first resembling a poor quality of milk, then changing to a reddish cast, finally becoming almost sanguineous in character. In several cases which have come under my observation I have found present a discharge resembling dark, grumous blood. In one case this discharge had been noticed by the patient several years before the induration was discovered.

A nodule may have been present, but the large size of the breast proved an effectual bar to its discovery.

Medullary Cancer.—The encephaloma usually commences as a small nodule situated upon the gland near its axillary border. The tumor is semi-elastic, of a purplish hue, is devoid of pain, and is not sensitive to the touch. It grows with great rapidity. It is extremely vascular, is endowed with a high degree of vitality, and may attain an extraordinary bulk, even within a few months from its first appearance. The vessels increase in size with the growth of the tumor, and are arranged in a close, intricate manner, which gives to it a somewhat mottled appearance.

Having once started, it is never retarded nor does it remain stationary in its progress. In from three to six months a distinct fluctuation may be revealed in some portion of the growth, while other parts may have a somewhat more elastic feel, resembling fibroma. The soft nature of the growth offers a ready transmission of the cells, and the lymphatic system becomes involved early in the disease. As the disease advances, the integument over the fluctuating surface becomes more and more tense, until finally, between the fifth and sixth month, ulceration takes place and a deep, abscess-like cavity is exposed. From the ulcerated surface dark, venous blood pours forth abundantly, and is only arrested by powerful styptics. The peculiar dark, venous hue of the growth is in marked contrast with the red appearance of the parts surrounding it.

While the hæmorrhage is under control, a profuse sanious discharge covers the ulcerated surface. As ulceration extends, unhealthy granulations spring up, giving the growth a peculiar, fungoid appearance. The hæmorrhage is liable to occur at any hour of the day or night, and becomes more frequent and copious. The patient begins to show the loss of blood; the face grows pale; the countenance pinched and sunken, the appetite is impaired, and the other evidences of cancerous cachexia appear.

Twelve months have elapsed since the commencement of the disease when the patient dies from the loss of blood and constitutional involvement.

Epithelioma.—A fissure of the nipple, or a wart-like excrescence, which has been made sensitive by the child in nursing, or chafed and irritated by the clothing, so that a raw surface is produced, is the starting-point of epithelioma. This surface soon becomes covered by a dry, bark-like scab which, if removed, leaves a bleeding surface. The scab soon forms again, but granulation does not take place. As from time to time the scab is removed, either by accident or design, the area of the ulcer becomes larger and larger. The discharge becomes more abundant, taking on a thin, sanious appearance, and by its acrid character eroding the neighboring parts. Granulations spring up on the surface of the ulcer, but they are feeble, lack vitality, and soon become disintegrated.

Once begun, the progress of destruction never ceases. The gland tissue becomes indurated, forming a hard base, resembling scirrhus. The lymphatics take on carcinomatous disease, and by the twelfth or fifteenth month the system becomes thoroughly infected. The sufferings of the patient are now greatly increased. The itching, smarting, burning pains, which have been present from the start, as induration increases, become lancinating in character.

By the end of the second year all of the symptoms of cancerous cachexia are present. The discharge from the ulcer is peculiarly offensive, permeating the clothing, the apartment, and even the entire dwelling. The disease is somewhat longer in its course than the other forms described, and does not terminate in death until three years have elapsed, and may even continue five years.

Colloma.—The tumor, in its commencement, is hardly distinguishable from scirrhus or encephaloma. Like the encephaloma, it is of variable density, but, unlike it, its growth is usually slow. As it increases in size, the peculiar nodular or uneven form of the tumor becomes more prominent. Here and there are evidences of cystic formation.

The pain, which is not marked in the early history of the growth, becomes more severe as the tumor increases in size, but is of itself not distinctive. As the disease advances and ulceration takes place, the cysts discharge their contents, some a yellow, jelly-like mass, others a reddish, starchy substance. A general feeling of unrest attends the tumor during the entire growth, and increases in severity as the disease advances. The disease may extend over a period of from three to seven years.

Melanoma.—The only case of melanoma which has come under my observation presented the following symptoms: The patient, who was 64 years of age, for several years had noticed a discharge from the nipple, at first sanguineous, but gradually growing darker until it was almost black. When collected in a vessel, it would precipitate a sediment resembling soot, the fluid remaining of a dark reddish hue. Five years before this she noticed a growth of the size of a chestnut at the upper and outer quadrant of the left breast. At the time of my first examination it had attained the size of a goose-egg. On account of the large amount of adipose, the contour of the tumor was not easily recognized. Six months later the patient received an injury by running against the sharp end of a pole, striking directly upon the growth. Up to this time the tumor had grown slowly and there had been but little pain. After the receipt of the injury the tumor grew rapidly, the pain became more severe, and the parts were sensitive to the touch.

Six weeks later, sloughing took place, leaving a deep, foul ulcer, the surface of which was as black as ink, and from which poured an abundant grumous fluid, resembling disintegrated blood. The patient now consented to an operation, and the entire breast and axillary glands were removed. She recovered rapidly, but two and a half years later died from a recurrent infiltration of the lung.

Prognosis.—The prognosis of cancer of the breast is always grave. If an early operation is undertaken, a much more favorable prognosis can be made as regards entire exemption from return or a lengthened lease of life than when the operation is deferred or the disease is allowed to run its natural course. If no operation is performed, the patient may live all the way from five months to five years, the average duration being 31 months. If an operation is performed, the patient may live from one year to an indefinite time, dependent upon the time upon which the operation is performed. Of 500 cases in which an operation was performed, at different stages of the disease, the average increase to life was 12 months; and 9 per cent. were radically cured; that is to say, the disease had not returned after a lapse of six years.

As an indication of what is sometimes obtained by early and complete operation, I cite the following case:

In 1866 I removed the mammary gland of Mrs. R—— on account of a small tumor which presented all the signs of carcinoma. Up to this date she has had no recurrence, although I understand she now has some trouble with her lungs. Whether this difficulty has any connection with the previous cancer-trouble I am unable to say.

Diagnosis.—In making a diagnosis of a cancer of the breast, the patient should be placed in a recumbent posture, with both breasts fully exposed.

The presence of a growth having been determined, the differentiation between an innocent and cancerous tumor will depend upon the following points in the history and appearance of the tumor:

If the tumor should appear about the 48th year of age; if there be hereditary predisposition, a history of transmission of puerperal mastitis or eczema of the nipple; if the tumor has grown rapidly and has formed attachments to the pectoral muscle and integument; if the nipple is permanently retracted; if there is enlargement of the lymphatic glands, general deterioration of health, or reproduction of the growth after operation,—then the tumor is undoubtedly carcinomatous so far as can be determined without microscopical investigation.

A hard nodulated growth appearing in the breast of a woman between the 45th and 50th year of age, which grows slowly and is accompanied by sharp cutting pains, induration and enlargement of the axillary glands, infiltration of the skin, retraction of the nipple, and fixation to the chest, followed later by disintegration of the tumor and the formation of a constantly increasing ulcer which gives forth an ichorous offensive discharge, is a scirrhous cancer.

Additional strength is given to the diagnosis if there is a history of cancer in the family, or if similar trouble is found in other portions of the body. If the tumor remains quiescent for a considerable period of time, it does not invalidate the diagnosis if other symptoms are present and the disease occurs in an old person, for such are the symptoms of atrophying scirrhus.

A large, soft, lobulated tumor which grows with great rapidity, accompanied by little pain, attached to the pectoral muscle, involving the integument, retracting or altering the nipple, implicating the lymphatic glands, with marked tendency to ulceration and formation of an abscess-like cavity, is an encephaloma or a medullary cancer.

A hard, slowly growing tumor, occurring toward the 45th year, with prominence of the veins, retraction of the nipple, adhesion to the integument, fixation of the chest, discharge from the nipple, and which, upon section, reveals different compartments filled with a jelly-like substance, is a colloid cancer.

A tumor which seems to begin in a mole, is hard, dense, and firm, grows slowly, is attended by a bloody discharge from the nipple, which presents the general symptoms of scirrhous cancer, but which, upon ulceration, takes on a dark hue, is covered by a dark fungous mass which gives forth a black, bloody discharge, is a melanotic cancer.

Treatment.—A great variety of views have been entertained in regard to the treatment of cancer involving the mammary gland. These views have been mainly based upon the ætiological, histological, or pathological standpoint occupied by the author or practitioner.

It would not be profitable to enter upon a discussion attempting to prove or disprove the many theories advanced. It is sufficient to say that I believe cancer is not hereditary, that it is not a material thing in the blood, but that the disease is local before it becomes general. The treatment here indicated will be based upon this hypothesis. Up to the present time no remedial agent has ever cured cancer, and only in few instances has the art of surgery succeeded in producing a desirable result. This statement will undoubtedly contradict the judgment and expressed opinion of many honest practitioners.

In almost every journal, and in works of more pretentious character, cases are reported "cured" by different remedies. The patient suffering from this fatal malady has only to imbibe freely of a decoction of condurango, swallow large boluses of Chian turpentine, drink freely of red-clover tea, or take internally or hypodermically phenic acid, in order, according to these authorities, to be entirely freed from his destroyer. Others believe with equal confidence in the various potencies of Arsenicum, Conium, Phytolacca, Lachesis, and similar remedies. While not prepared to dispute the efficacy of the above named drugs under proper conditions, I believe that in the cases of carcinoma reported cured there was a mistaken diagnosis; at least I have been unable to obtain any such results from the remedies mentioned.

Cases of nodules and tumors of the breast pronounced carcinoma by other authorities and treated by me have recovered entirely, leaving no taint or constitutional contamination. The cases were received by me with some doubt in regard to their nature. The fact that without any operation they were cured, all induration dispersed, was the strongest proof in my mind of their non-malignancy. There is such a wide field for difference of opinion in regard to tumors of the breast in their earlier stages, before they are stamped with the unmistakable characteristic appearance, or before the presence of constitutional involvement, that it is unsafe to be absolutely positive in classifying the trouble.

No test except the microscope may be recognized as absolute, and even this instrument in the hands of a novice becomes very uncertain.

Treatment may be divided into: I. General and Prophylactic; II. Palliative; III. Surgical.

Under the first head is recognized any remedial agent, or the employment of any hygienic or sanitary measure, which may in any manner prevent the development of cancer or retard its progress after it is once established.

To prevent the formation of a tumor is much more satisfactory, if not more scientific, than to attempt to cure the trouble after it is once established. It may seem strange to speak of prevention of carcinoma of the breast when its previous existence, as a constitutional disease, is not recognized. When the inherent tendencies of a certain temperament are understood, judicious care may prevent certain results which would undoubtedly follow if the patient were exposed to the ordinary vicissitudes of life.

A person having constitutional tendency to tuberculosis may have that disease precipitated by unfavorable climate or other unfortunate surroundings. One predisposed to arthritic diseases will readily suffer by the violation of hygienic laws. So one predisposed to carcinoma becomes a victim of this disease in the mammary gland by neglect of the breast during lactation or by unfortunate traumatism of the gland during or after the menopause.

Small nodules of the breast, apparently innocent, frequently take on rapid degeneration from an unfortunate contusion. The importance then of general or prophylactic treatment cannot be too much emphasized. Women should be instructed to exercise great care in the management of the breasts during the period of lactation. Should mastitis arise, the physician in charge of the case is culpable if he fails to do all in his power to bring the disease to a favorable termination. If abscesses occur, pus should not be allowed to pocket and burrow in the gland structure. Excoriated or fissured nipples should be promptly healed. Mothers should instruct their daughters to avoid injuring the breasts by pads or artificial forms which might lay the foundation for future cancerous growths. In all cases where there is strong sympathy between the mammary gland and the reproductive system, evinced by irritation of the gland during the menstrual flow, the indicated remedies should be administered with a view of correcting the nerve derangement, thus preventing the unusual hyperæsthesia of the gland at such times. All women having cancerous antecedents, and especially if subject to arthritic disease, require watchful care during the climacteric. Any inflammatory condition of the gland should be speedily subdued. A blow or a strain, followed by a stinging, burning sensation which remains for a long time and recurs from the slightest touch should excite our apprehension for its relief.

Local Applications.—The following local applications are useful in controlling inflammatory conditions so often predisposing to cancer: Calendula lotion or cerate, Pond's extract, dilute Arnica, Phytolacca lotion or cerate, Carbolic acid lotion, Plantago lotion or cerate, Rhatany lotion or cerate, Camphorated oil and lard. Calendula will be found most serviceable in all forms of acute inflammations, threatened suppuration, or incised wounds of the gland.

Dilute Arnica in contusions of the gland has been used with good success. Phytolacca lotion or cerate, or the fresh root made into a poultice, is valuable in all indurations attending or following lactation. Frequent applications should be made by gentle rubbing, followed by covering the part in warm cotton-batting. Carbolic acid may be used in lotion or as a cerate for fissured nipples, or for obstinate ulcers of the breast with indurated edges. Plantago cerate will relieve the dry eczematous condition so frequently found about the nipple. Rhatany cerate is of most value in cases in which the areola and base of the nipple crack easily and are inclined to bleed readily. Camphorated oil should be used in chronic inflammations and indurations of the breast in which the lymphatics leading to the breast are enlarged. Salt lard, applied as warm as the patient can bear it, making three or four successive applications, an hour apart, followed by application of hot cotton-batting or flannel will relieve induration of the gland in acute inflammation of the lacteals.

Remedies.—For the conditions named above Aconite, Belladonna, Bryonia, Calcarea carb., Calcarea phos., Calcarea iod., Mercurius, Phytolacca, Pulsatilla, Aurum, Arsenicum, Iodum, or Sulphur may be serviceable in relieving a train of symptoms and conditions which might lead to the development of cancerous growths. They should be employed in accordance with the pathogenesis of the case.

Palliative Treatment.—A tumor having formed which shows the characteristics of carcinoma, it is the duty of the practitioner to allay, so far as possible, the apprehensions of the patient by presenting to her the most favorable prognosis possible, in order that her mind may be diverted from the local trouble. Frequent examinations should be avoided. If the tumor is of slow growth, an examination every three or four months is sufficient; if a rapid formation, an examination every month should be made. The general health of the patient should be carefully regulated, all digestive disturbance being promptly met by the suitable remedies. The local applications recommended in the treatment of mammary inflammations may be used with much benefit to control, if not to cure, the morbid process.

Of these, Phytolacca and the phosphorated oil are of most benefit. In their use, and especially in the case of phosphorated oil, great caution should be exercised. If the application produces a diffuse redness or miliary rash, if there is coincident disease of the os uteri, no application should be made to the breast that would have an effect to disperse the swelling there to the development of the uterine trouble, for the disease is better and more easily treated in the gland than in the uterus.

In tumors which are exceedingly sensitive in the early stages, cloths saturated with a lotion composed of equal parts of Pond's extract and Opium tincture applied to the breast may afford great relief. Itching, burning, and stinging sensations about the nipple, and associated with a dry eczematous condition about the areola, are best met by an application composed of Iodide of potassa, one part, Glycerine, two parts; or by a cerate made from sumach-buds. Hypodermic injections of Phenic acid, combined with the internal administration of the same remedy, have, in my hands, proved effectual in dispersing nodules in the breast pronounced by good authorities to be carcinomata. If it does not succeed in disposing of the tumor it will, in many cases, relieve the pain. As the tumor gradually advances toward the stage of disintegration, and the parts take on a pinkish or purplish hue, a compress of Calendula and cosmoline will retard the ulcerative process and relieve the pain.

After the surface has become broken, there is an additional complication in the very offensive discharge of the hard cancer and in the hæmorrhagic tendency of the soft cancer. In the former instance I have found great service from the following application:

Pure gypsum, ...	1 ℔.
Oil of tar, ...	1 oz.

Triturate well.

To a small portion add sufficient olive oil, and mix until reduced to the consistency of cream. This may be spread upon a piece of surgeon's lint and applied to the ulcer. It absorbs and deodorizes the discharge, relieving the patient from the terrible stench.

If the discharge is profuse, the application should be changed frequently, as the plaster becomes very hard after it is saturated with the discharge. Dilute Listerine, a 10 per cent. solution of Platt's chlorides, or a 10 per cent. solution of carbolic acid and glycerine may be used in the same manner.

In soft cancer, when the hæmorrhage is troublesome, styptic cotton, absorbent cotton saturated with a 10 per cent. solution of Persulphate of iron, or cotton saturated with equal parts of Rhatany and Pond's extract, will control the hæmorrhage and give relief to the patient.

Internal Remedies.—The following remedies will tend to retard the progress of the disease and relieve the suffering.

Aconite.—When active inflammatory invasion accompanies the growth, attended with dry surface, severe pain, rapid pulse, and fear of death.

Arnica mont.—In the earlier stages, when the breast feels sore as from contusion, and soreness and pain attend the act of raising the arm; a bruised sore feeling over the entire body.

Arsenicum album.—Arsenic is one of the most important remedies in all forms of cancer. Peculiar burning pain as if caused by a hot iron; a general sense of heat in and around the breast; an offensive ichorous discharge after suppuration. Dark livid ulceration. Burning in the epigastrium. Derangement of the whole digestive system. Restlessness; flashes of heat alternated with chilliness; disposition to draw the bed-clothes over the head.

Arsenicum iodatum.—Especially applicable in epithelioma and cancer having an origin in eczema.

Belladonna.—Indurated inflamed mammary glands, attended with lancinating and throbbing pain; full pulse, flushed and bloated face.

Bryonia.—General muscular soreness or muscular soreness of the breast; tearing and lancinating pain in the breast and in different parts of the body; great desire to wet the mouth; dry, difficult stools.

Chamomilla.—Drawing pains in the breast, aggravated at night; sleepless at night.

Conium mac.—Hard, small, stinging nodules with stinging pain; one of the best remedies in scirrhus.

Clematis.—Indurated mammary glands, painful only on manipulation; burning, throbbing, or stinging pains about the margin.

Carbo veg. and **Carbo animalis.**—Both serviceable in dark cancer with dark purplish hue, or when the discharge consists of dark, disintegrated blood.

China.—Pronounced hæmorrhagic diathesis, and presence of symptoms resulting from the loss of animal fluids.

Hamamelis.—In soft cancer, with hæmorrhagic tendency and ecchymosed spots in different portions of the breast.

Phosphorus.—Subjects of tubercular diathesis, temperament, and hæmorrhagic tendency; deep ulcers with bold indurated margins, attended with sharp, needle-like pains.

Phytolacca.—Particularly applicable in the first stage of cancer, with general mastitis and induration of the breast, arising from lactation.

Phenic acid.—This remedy is often serviceable in relieving pain of ulceration and in retarding the process of disintegration.

The following remedies are serviceable according to their several indications: Argentum metallicum, Iodine, Mercurius, Lachesis, Nitric acid, Muriatic acid, Rhus tox., Nux vom., Pulsatilla, Tarantula.

When the cancerous growth is attended by hypertrophy, the breasts should be supported by straps and bandages, and the tumor carefully protected from the pressure of the clothing.

Surgical Treatment.—The question of operative procedure in cancer of the breast is one of great importance to the patient, and one upon which the medical profession are somewhat divided. The majority of surgeons at the present day recommend the early removal of the morbid growth. Eminent practitioners of all schools, on the other hand, denounce operative interference as worse than useless.

If, as *I believe*, the disease is local before it becomes constitutional, an operation affords the most reasonable grounds for the hope of a radical cure. That this hope is not without foundation is shown by the results which have been attained when early and thorough operations have been made. Tumors which have been pronounced carcinoma, and in which the microscopical indications have been present, have been cured when the operation has been performed before the disease had invaded the deeper structure or attacked the lymphatic glands. Even if the disease has advanced beyond the early stage, or if it were admitted that the disease is incurable, a surgical operation should still be advised. Consider, for a moment, the condition of a cancer subject who has determined to let the disease take its natural course. From the best collated statistics the average duration of the disease is about three years, many terminating within nine months, and a few being prolonged to several years. Fatality is stamped upon all; there is no escape from the fatal termination; from the beginning to the end the patient must suffer more or less. In the majority of cases life becomes a burden, and the sufferer anxiously awaits the coming of death.

Much of this suffering and pain can be relieved, and even life itself prolonged, if the tumor is thoroughly removed by an operation. Operations, therefore, may be advised regardless of the view held concerning the origin of the growth:

First. Because it *may* cure, and because it *does*, in the great majority of cases, according to the best collected statistics, prolong life from one to five years.

Second. The removal of the diseased tissue, even when the cancerous cachexia is present, is a great relief to the suffering patient.

The weight, the pressure, and the local pain are removed. The foul, offensive, unhealthy ulcer disappears, and an open, healthy granulating surface takes its place. The condition of the patient is changed to one of tolerance, and even if her days are not prolonged, life will cease to be a burden.

There are two methods of removing cancerous growths, by the knife and by caustic and escharotics. There was a time when escharotics, in the form of plasters, were employed by all classes of physicians and surgeons. At the present day, save in a few exceptional cases, they have been discarded by the profession in general. There are a few medical men who, taking advantage of the natural prejudice which exists on the part of laymen against the use of the knife, have founded institutions for the complete removal of cancerous growths by means of plasters.

By the assurance of the removal of the growth without the use of the dread knife, the patient is induced to submit to long months of torture, which might have been avoided by the rapid, safe, and painless removal of the growth by the scalpel. The removal of the breast by the use of escharotics is not only much more protracted, but much more painful than by any operative procedure. Days, weeks, and months are required to accomplish by caustics what, by the use of the knife, might be done in a few moments.

The assurance of the advocate of the plaster that the operation is a painless one, a safe one, and a radical one, the "roots" of the cancer being removed, which it is impossible to do with the knife, is not entirely correct.

The pain is almost unbearable, exceeding the original cancer-pain, very few patients being able to bear it without the more or less free use of anodynes. The suffering is prolonged, valuable time is wasted, and the stage of constitutional involvement is rapidly reached. It is no more radical than the use of the knife. And the expression that the "roots" are removed is, to say the least, unscientific. The small fibres which are attached to the growth when removed by the plaster, and called roots, are nothing more than portions of fibrous tissue. When the plaster is applied, the adipose and soft tissues are first destroyed, the dense or fibrous tissues remaining. When the mass is removed, these fibrous threads come away in strings and are called roots.

Any one who has read the pathetic recital of Mrs. Gosse, as related by her husband, Philip H. Gosse, F.R.S., will have little hesitation in refusing to accept the specious claims. There can be no doubt that the removal of the breast by the knife, under the influence of an anæsthetic, is the quickest, safest, least painful, most radical, and in all respects the better mode of procedure.

There are two methods of removing the breast by the knife, extirpation and amputation. When the former method is adopted, the gland is entirely removed, but such portion of the integument as is not infiltrated is allowed to remain, and serves as a cover to the raw surface.

When the second method is adopted, the entire gland structure and integument is removed by a circular incision, leaving a large open wound, to heal by granulation. In the majority of cases I earnestly recommend the latter operation. In all cases I would urge operative procedure as soon as a satisfactory diagnosis of the case can be made. The earlier the operation, the greater the probability of cure or, at least, of a prolongation of life.

DISEASES OF THE NERVOUS SYSTEM.

A. DISEASES OF THE BRAIN AND ITS MEMBRANES.

BY J. MARTINE KERSHAW, M.D.

CEREBRAL HYPERÆMIA.

Synonyms.—Cerebral congestion; German, Hyperämie des Gehirns; French, Hyperémie cerebrale.

Definition.—A condition of congestion of the brain, or abnormal increase of blood in the cerebral vessels, which causes undue pressure and excites symptoms expressive of cerebral irritation.

Ætiology.—Men are most commonly subjects of cerebral hyperæmia, and it is observed most frequently in middle life, or at the period of life when the brain is the most active. Cold, according to several observers, tends more readily than heat to develop cerebral congestion. Excessive heat is indeed a potent factor in the production of this trouble, and insolation, or sunstroke, is an instance.

Excessive and long-continued brain-work, loss of sleep, worry, care, and emotional excitement develop a tendency to cerebral hyperæmia. A common cause is rapid over-eating, and especially so when the subject is angry, indignant, or in a state of violent mental excitement. Thick-necked people, with short, stout bodies, are particularly liable to this trouble. The poison of malaria has caused intermittent, and even continued, attacks of cerebral congestion. Suppression of the menses, of the hæmorrhoidal flux, sudden violent physical exertion, disease of the left side of the heart, disease of the kidneys, syphilis, gout,—all these are liable to overcharge the brain with blood, and thus to excite symptoms of cerebral irritation. The excessive use of alcohol, the opium habit, or the careless use of nitrite of amyl has a similar effect. Embolism, thrombosis, or tumors of the brain are also exciting causes. The passive type of congestion is especially likely to be brought about or aggravated by increased atmospheric pressure, the wearing of tight collars, tumors of the neck, blowing of wind-instruments, or the assumption of the stooping position, particularly when making great physical exertion.

Pathology.—Post-mortem examinations reveal an overcharged condition of the vessels of the dura mater and pia mater. The sinuses are also filled with blood. The *puncta vasculosa* are prominent, while numerous capillary aneurisms are observed. All the capillaries are enlarged and tortuous. Œdema of the pia mater and choroid plexuses is sometimes observed, and, in cases of long standing, where the subjects were advanced in years, cerebral atrophy. That the symptoms which we attribute to cerebral congestion are due to this condition may readily be seen by the hanging of the body with the head downward, for a few moments, when all the prominent symptoms of cerebral blood-pressure, both subjective and objective, are quickly produced. The brain will accommodate itself to bear considerable pressure from the presence of an over-amount of venous and arterial blood; it does this because of its peculiar yielding qualities, and by the giving way of the cerebro-spinal fluid in the ventricles of the brain.

Symptomatology.—The symptoms may be very light and consist of only a simple flushing of the face or of a light throbbing of the temporal arteries. On the other hand, they may prove very grave, and the first manifestation of disease may consist of an attack of mania, convulsion, or a condition of stupor. A maniacal attack due to cerebral congestion is not uncommon. The patient is restless, very active, the eyes are injected, the hearing very acute, the head hot, the face red and puffed, while the whole manner and character of the individual are manifestly changed. The patient complains of headache, while the body is chilly. His whole appearance indicates great mental excitement, and while in this state he is likely to commit suicide or do some act of violence to an unsuspecting friend or neighbor. Several cases of this kind have come under my observation.

Attacks of mania are usually due to *active* cerebral congestion. The convulsion is very like that of an epileptic seizure. The patient does not, however, make an outcry at the onset of the attack, nor is there an *aura epileptica* observed. The attack is usually followed by deep sleep. An attack of this kind is due, as a rule, to excessive arterial pressure.

Some attacks of cerebral congestion are ushered in almost exactly like an attack of apoplexy. The patient suddenly falls, but is not, as a rule, entirely unconscious. He answers direct questions made in a loud voice, but articulates with difficulty. His mind is, however, greatly obscured, and when not disturbed, he sleeps profoundly. The breathing, unlike that of apoplexy, is not stertorous. There may be some paralysis. He usually recovers in a few hours or days, although there are some fatal cases on record. Throbbing headache is a pretty constant symptom of this disease, together with a sense of tightness of the scalp and noises in the ears. All the senses are over-acute; specks before the eyes, photophobia, and double-vision are also troublesome symptoms. The head is hot, there are hallucinations and vertigo. Sleeplessness is a marked and persistent symptom of most cases. The morbidly active mind keeps the patient awake, and with a hot and aching head, a burning face, and cold feet, he tosses about until daylight, and then falls into a troubled sleep. The subject is usually irritable, nervous, and over-excitable, either pleasantly or unpleasantly. The character is generally greatly changed. Twitching of the muscles of the face, numbness, and partial paralysis are common symptoms.

When the trouble is mainly due to venous pressure the patient is inclined to be stupid. He looks soggy and sleepy, and frequently does sleep heavily a great deal of the time. The face is blue, puffed, and the veins of the neck are large and prominent. Sometimes the patient becomes aphasic; but this condition, like the paralysis, the attacks of mania, the stupor, the apoplectiform and epileptiform seizures, are all due to temporary pressure (either arterial or venous) upon the brain, and disappear upon its removal. Bleeding of the nose occurs occasionally, and generally relieves the patient for the time being.

Varieties.—There are two varieties of cerebral congestion; the *active* and the *passive*. The active form is due to the presence of an excessive quantity of arterial blood in the vessels of the brain; the passive form to some obstruction which impedes the return of the venous blood from the brain. The first is usually manifested by great mental excitement, restlessness, or mania; the latter by dulness, heaviness, and tendency to sleep.

Diagnosis.—It requires great care and experience to separate cerebral congestion from the several varieties of disease which it closely resembles. It may be confounded with cerebral anæmia; but the pale face, generally bloodless condition of the body, and the great relief by the assumption of the recumbent posture, as found in anæmia, will, when contrasted with the full habit, hot head, and red face of cerebral congestion, show the real character of the trouble.

Auditory vertigo—Menière's disease—is clearly an ear trouble, a disease of the semicircular canals; stomachal vertigo is due to gastric trouble, and occurs, usually, while the stomach is digesting, or attempting to digest, the food within its cavity. Urinæmia is traceable to disease of the kidney, while the anasarca of the limbs and face, together with the convulsions and coma, frequently repeated, point clearly to the real seat of the disease.

An epileptic utters a peculiar cry, falls suddenly to the ground, has first a tonic convulsion, followed by clonic convulsions, the tongue is frequently bitten, and there may be an *aura epileptica.* A subject of cerebral congestion has premonitory symptoms, falls slowly, staggers, does not cry, the tongue is not bitten, and there is no *aura epileptica.*

Softening may be mistaken for cerebral congestion, but the age of the subject, the gradual advance of the paralysis, and its persistent character, the feeble intellect, with the difficulties of speech, will make manifest the trouble in hand. In thrombosis the difficulty is localized, begins gradually, and continues to advance persistently; the paralysis is marked, while the loss of the memory of words, and the troubles of articulation, are more pronounced and lasting than like troubles due to congestion affecting the middle cerebral artery, in the neighborhood of the island of Reil. Head troubles due to embolism bear some resemblance to those due to congestion; but the symptoms, the result of embolism, come on suddenly; the pulse is quick and irregular; there is usually disease of the mitral or semilunar valves, and the subject rarely recovers entirely. In cerebral congestion the pulse is usually slow, there are not necessarily heart complications, and recovery is likely to be complete. Cerebral hæmorrhage may be mistaken for cerebral congestion, but in the apoplectiform variety of congestion the breathing is not stertorous, there is no puffing of the lips, consciousness is not completely lost, sensibility and motion are not entirely abolished, and the symptoms are generally of only temporary duration.

Prognosis.—Slight cases, in persons of good habits, with favorable surroundings, and in those not addicted to the abuse of stimulants, are quite likely to recover. Old persons, those with broken-down constitutions, or subject to worry, care, or great mental strain, are very unfavorable cases, and are not likely to recover rapidly. Repeated attacks call for a very guarded prognosis. Recovery from the passive variety of cerebral congestion usually takes place much more slowly than from the active, and is, altogether, by far the most serious affection of the two.

Treatment.—*Preventive.*—First, do away, as far as possible, with the cause, and then, by rational living, improve the condition of the brain and the general system.

Hygienic.—The patient should take daily out-door exercise, and it should be kept up persistently for a length of time. The overcharged brain should be relieved by getting the feet and general body tired; for, as the blood flows to these parts as a result of exercise, it flows *away* from the brain, and thus establishes a happy balance between the two that cannot fail to prove of benefit to the subject if it be kept up a sufficient length of time to permit of the cerebral vessels getting back to their normal condition. Horse-back riding and driving also tend to refresh and invigorate the body, and thus do away with the inordinate brain-pressure. Stimulants should be avoided entirely. There should be no restriction of the neck, the shirts, collars, and ties should be large and loose enough to permit of the blood passing upward or downward without any obstruction whatever. The stooping position should be studiously avoided. No severe exertion should be taken, and gymnastics should not be thought of under any circumstances. Turkish baths are also useful in the treatment of this trouble.

Therapeutics.—**Aconite.**—This remedy is indicated in acute congestion of the brain, and in the active form of the disease. A full bounding pulse, throbbing headache, great restlessness and thirst, delirium, and vertigo, point to it. When the trouble has followed exposure to the sun, or is directly due to great and sudden emotional excitement, Aconite will prove very serviceable.

Belladonna.—An especially useful remedy in the active form. It is called for in the maniacal, apoplectiform, or epileptiform manifestations of this difficulty. A red face, injected eyes, hot head, throbbing headache, great rage with disposition to bite, great inclination to jump out of bed, persistent insomnia, are its special indications. The patient feels sleepy while sitting, but becomes wakeful as soon as he lies down. Sudden starting when just falling asleep. It is the prime remedy in the cerebral congestions of childhood.

Gelsemium.—Especially useful in the passive form of cerebral congestion. Great muscular prostration, vertigo, dimness of vision, dropping of upper eyelids, drowsiness and langor, are symptoms particularly controlled by this remedy. It should be thought of where there is reason to believe that remittent or intermittent fever bears a causal relation to the trouble.

Glonoin.—This is the important remedy to be employed in cases of active congestion due to exposure to heat of the sun. The apoplectiform and epipleptiform varieties are particularly within the sphere of action of this remedy. Congestion following menstrual suppression finds its prime remedy in glonoin. It is also useful in the lighter forms due to pelvic irritation. The headache is usually referred to the vertex, is of extreme severity, and is generally associated with great mental depression.

Hyoscyamus.—Useful in the active variety, and especially where the maniacal or epileptiform manifestations of the trouble are present. Lascivious mania, with injected eyes, great nervous excitement, illusions, hallucinations, sleeplessness, and muscular twitchings.

Nux vomica.—To be used in cases due to excessive mental work, loss of sleep, worry, to over-alcoholic stimulation, abuse of tobacco, and in persons of sedentary habits. The cases calling for this remedy are usually chronic. Sleeplessness, beginning at two o'clock in the morning and continuing until daylight, is a special indication for nux vomica. Constipation, hæmorrhoids, and general gastric disturbance are usually associated with the head troubles.

Opium.—Passive congestion of the brain, with symptoms of the apoplectiform variety. Heaviness, stupor, stertorous breathing, blueness and puffiness of the face, difficult articulation, with jerking and twitching of the body.

Stramonium.—This remedy is called for where there are maniacal or epileptiform seizures. The nervous excitement is extreme, while the delirium is of an active, furious character. The character of the delirium is extremely changeable, the patient being pleasant and agreeable one moment, and violent and furiously angry the next. Illusions and hallucinations of horrible images and animals terrify the patient; vertigo is a prominent symptom, as is also blindness of a transient character.

Veratrum viride.—Especially applicable to the active form, and when there are symptoms of mania and convulsion. Dry, hot skin, thirst, severe muscular twitching, and chorea-like in character; useful where the congestion is due to malarial poison.

Remedies to be consulted: Arnica, Calcarea carbonica, Iodum, Sulphur.

Auxiliary Treatment.—In all cases the head should be elevated at once, so that the flow of blood to the brain may be impeded, while at the same time the venous blood is aided in its return. Cold should be applied to the head, while applications of heat and friction should be made to the body. Stimulants should be avoided in the active variety, but they may be given in some extremely prostrated cases of the passive form.

CEREBRAL ANÆMIA.

Definition.—A morbid state characterized by great pallor of the face, debility, vertigo, noises in the head and, in extreme cases, by attacks of syncope. The trouble is due to insufficient cerebral blood-supply, and is usually associated with poverty of the blood also.

Ætiology.—This condition is commonly associated with general anæmia of the body. It is frequently due to uterine hæmorrhages—miscarriages, post-partum losses—too profuse menstruation, cancer, and hæmorrhoids, chronic dysentery, discharges from abscesses, chronic leucorrhea, prolonged nursing of children, especially the pernicious habit of taking the child to bed and permitting it to suckle the entire night; a habit of this kind will break down the constitution of the strongest woman. Too frequent child-bearing is a common cause. Worry, care, the reaction from great mental strain, loss of sleep and rest, insufficient food and clothing, vitiated air, want of exercise and sunlight, all these causes tend to make the blood thin and watery, and induce anæmia. Constipation, uterine congestion, torpidity of the liver, fatty degeneration of the heart with enlargement, tumors, growths, aneurisms pressing upon the carotid and vertebral arteries and interfering with the upward passage of the blood; atheromatous narrowing of cerebral vessels; cerebral hæmorrhage, thrombosis and embolisms are also causes. The bromides and the hydrate of chloral both act directly on the vessels of the brain and induce anæmia. Numerous cases are on record of excessive depletion of the brain due to these agents. Many women habitually use chloroform to mitigate suffering at the menstrual period; others from habit employ it to allay any kind of pain; I have seen several marked cases of cerebral anæmia that were due to the abuse of chloroform. The long-continued use of zinc has also brought about this difficulty.

Sudden attacks of cerebral anæmia have sometimes followed the application of electricity to the pneumogastric nerve or to the brain generally. I have had this happen several times while making electrical applications, and Hammond mentions several instances of the kind.

Pathology.—Few subjects die of cerebral anæmia, and hence post-mortem examinations of cases of this kind are but rarely made. There is, however, little to be said on the subject, as the brain and cerebral vessels undergo little or no change. The difficulty is one of bloodlessness, and that is what we discover after death. The brain is white and reduced in size. The bloodvessels are empty and the *puncta vasculosa* absent or scarcely discernible. The third and lateral ventricles are distended with fluids, as are also the arachnoid and sub-arachnoidean spaces.

Symptoms.—The prominent and leading symptoms of cerebral anæmia are sleepiness, drowsiness, and intellectual apathy. The drowsiness is marked while sitting or walking, but the patient is inclined to be wakeful as soon as the recumbent posture is assumed.

This latter symptom strongly and almost certainly points to cerebral anæmia. The blood, while the subject is standing or walking, flows to the extremities, depletes the brain, and induces drowsiness; as soon as he lies down the blood flows back to the brain, brings about a condition of comparative hyperæmia, and makes the patient wakeful. These are the general symptoms of the disease under consideration; the special features will be given while treating of the several varieties.

Varieties.—There are four varieties of this disease: the acute, known as syncopic or fainting; the localized or partial*; the chronic form; and the infantile variety (the hydrocephaloid of Marshall Hall).

The *acute form*, commonly known as fainting, is observed after sudden shocks, mental or physical; it follows extreme hæmorrhage after abortion, childbirth, injuries of large arteries, epistaxis, secondary hæmorrhages after surgical operations, hæmoptysis or hæmatemesis.

The chronic form is associated with a general lowered, anæmic condition of the whole body. The sclerotic coats of the eyes are of a bluish color and the pupils dilated. Sometimes there is dilatation of only one pupil. The eyes are painful to light, and ophthalmoscopic examination reveals a straight condition of the vessels of the retina. The hands and feet are cold and clammy, and the pulse small and thready. There are heart-murmurs, and the sphygmographic tracings are nearly straight. The skin is inclined to be bluish-white in color. There is great general weakness, backache, and loss of appetite. There is generally some headache, but neuralgia of a marked and persistent character is a common accompaniment of cerebral anæmia. In most marked cases there are noises in the ears, and these, with the headache, are greatly aggravated by suddenly lying down or rising, due in all probability to the rapid change of the blood-supply of the brain, together with an over-impressible condition of this organ. Some subjects are very melancholy. Loss of memory is also a prominent symptom. Hallucinations of sight and hearing are also frequently observed. Hammond reports a case where the subject frequently conversed with an imaginary black man. She firmly believed in the existence of the man, hence, what was at first probably an illusion only, later became a delusion; she was therefore insane. Palpitation of the heart, constipation, and indigestion are troublesome features of this difficulty.

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* This variety will be treated under the head of thrombosis and embolism.

There is generally great disposition to sleep while in the upright position, while wakefulness whenever the patient assumes the recumbent position is a marked feature of this complaint. The body is poorly nourished, and the legs and ankles are frequently œdematous. The urine is sometimes albuminous. General tiredness and aversion to exercise are common symptoms. In very serious cases facial paralysis, hemiplegia, or paraplegia are observed. They are functional in character, and yield to appropriate treatment.

The Infantile Form.—One of the first symptoms is irritability, fretfulness, and a feverish condition of the child. It is also restless, the face is flushed, the skin hot and dry, and the pulse quick. The little patient's rest is frequently disturbed by sudden starts from sleep, and it sometimes utters sharp, shrill screams. Its breathing is of a sighing character, and it moans during sleep. There are frequent mucous evacuations, with flatulence. With the progress of the disease the surface of the entire body becomes cold and clammy, the eyelids half-closed, the eyes set and motionless, the breathing quick and irregular, the sighing more marked, the voice becomes husky, and a dry, hacking, troublesome cough sets in. A little later, the breathing becomes more rapid and irregular, the rattling loud and noisy, the stupor more profound, the skin, if possible, more cold and clammy, and in a short time the child dies from exhaustion.

Diagnosis.—There should be no great difficulty in recognizing this disease, as the appearance of the patient will generally point in the direction of the trouble, while the history of the case should remove any doubt as to its character. It is, however, sometimes confounded with cerebral hyperæmia.

The following table shows the distinctive features of each disease.

CEREBRAL ANÆMIA.	CEREBRAL HYPERÆMIA.
Weak, anæmic, pale appearance of face.	Full habit, florid complexion.
Headache mostly frontal or on vertex, and neuralgic in character.	Headache diffused and of an aching character.
Great disposition to sleep.	Insomnia a prominent symptom.
Inability to do mental work.	Excessive mental activity.
Dilated pupils.	Contracted pupils.
Weak, small pulse.	Full pulse.
Anæmic murmurs, straight sphygmographic tracings.	No heart sounds.
Stimulants relieve.	Stimulants aggravate.

Cerebral anæmia might be confounded with stomachal vertigo; but the connection with gastric disturbance, and the, perhaps, full habit of body of the subject would indicate the real difficulty present. Menière's disease, or vertigo due to irritation of the semicircular canals, is an organic trouble, and could hardly be confounded with the functional difficulty having for its cause anæmia of the brain.

Prognosis.—Generally speaking, the prognosis is favora
cause can be removed, if the patient is young, and can be p
favorable surroundings, the chances are all in favor of rec
cannot say as much of old chronic cases. Those havin
tuberculosis or cancer cannot hope for much more tha
treatment. During the days of venesection cases were
gravated by being bled, the surgeons in charge mistaking
for hyperæmia.

Treatment.—*Preventive.*—Establish good mental a
habits. Prevent the condition of general anæmia by
regularity in sleeping and eating, order the liberal use c
stantial food and daily out-door exercise. Exercise of bo
body are alike necessary, but over-work of any sort, co
time, will break down the nervous system and tend to dev
ficulty under consideration.

Hygienic.—First of all *remove the cause*, if possible. If t
subject to excessive losses at the menstrual period, that d
have to be overcome before progress can be made in the c
cure. All other losses, such as leucorrhœa, seminal disc
orrhoidal bleedings, etc., must be arrested before subst
can be secured the patient. A case of cerebral anæmia
food, such as eggs, fish, chicken, beef, oysters, game, an
The blood of an anæmic subject is pale, thin, watery, a
capable of keeping up the health of the individual. Goo
good blood, and good, rich, red blood feeds and nourishes
machinery of the system and enables each organ to do str
healthy work. Exercise in the open air, with plenty o
very important in effecting a cure. In bad cases mass
It should be done intelligently by an experienced masseur
and, in connection with it, Mitchell's "rest treatment"
recommended. Both mind and body should have res
climate, in some instances, is absolutely necessary.
mountains or a sea-voyage frequently begins the work
once. Beside the aids already mentioned, whiskey, br
are often, and indeed generally, of great service in build
ject of this class. Whiskey is, in many cases, indispen
wine, and the malt preparations are also of service. In
hollow suppositories may be filled with whiskey, beef
foods, and placed in the rectum. When the stomach
the strength may be kept up for an indefinite time by th

Therapeutics.—**China off.**—This is the great remedy for an
losses in the form of blood, mucus, pus, or semen. It does not act
losses continue, but balances the patient, after the drains have cea
the debility remaining. It exerts its power especially in cases due t
nursing, free sexual indulgence, masturbation, epistaxis, menorrhag
and leucorrhœa. Palpitation of the heart, great disposition to faint, a
ears are indications for this remedy.

Ferrum.—A prime remedy for cerebral anæmia, associated usually with general anæmia. Disposition to faint, vertigo on suddenly changing the position, great weakness, hollow sounds of the heart, and anæmic murmurs in the vessels of the neck, point to Ferrum as the remedy. Ferrum patients are frequently of full habit and florid complexion, and these give them the appearance of persons in good health; but the flesh is flabby and soft, and the subject really very weak and anæmic.

Pulsatilla.—Is especially indicated in young girls changing from girlhood to womanhood. The tax on the system at this time, together with excessive study, impoverishes the blood, and either prevents the appearance of the monthly period, or causes it to disappear after its establishment. Amenorrhœa with bloatedness of the hands, face, and feet, chilliness, vertigo, with disposition to be in the open air, are indications for this remedy.

Arsenicum.—Cerebral anæmia due to malarial fever. It antidotes that particular form of anæmia the result of excessive cinchonism. Great depression of the vital forces, exhaustion, constant nausea, coldness of the hands and feet, great restlessness, thirst for small quantities of water but often, patient wishes to be kept warm. Bloatedness of the hands, feet, and face are characteristics of this remedy. Also very useful in hydrocephaloid.

Phosphorus.—Nervous exhaustion, with great anæmia, the result of excessive mental work, sexual excesses, or incident to the development of tuberculosis. Tall people with long chest and long legs are subjects especially likely to be benefited by Phosphorus. Dry, hacking cough, night-sweats, and tendency to vomit as soon as fluids become warm in the stomach. Useful in infantile variety as well as in chronic form in adults.

Nux vomica.—A long-tried and thoroughly satisfactory remedy in cases due to excessive stimulation. The constant use of whiskey, brandy, wine, rum, beer, coffee, and tobacco sets up a hyperæmia of the brain, and when the reaction comes we have the opposite condition—anæmia, a condition in which no remedy will do as much good as Nux vomica, aided by good substantial food. It is the brain-workers' remedy, and is of especial service when the subjects are professional people—lawyers, physicians, teachers, or students. Frontal headache, and especially irksome ache in the cervical region of neck, constipation, and hæmorrhoids strongly indicate Nux vomica.

Ignatia.—Run-down hysterical subjects that have become anæmic from mental care and worry, especially grief. Quiet, pent-up, nervous women greatly inclined to cry, and who complain of the globus hystericus frequently. General twitching of the body. Frequent sighing, great desire for solitude.

Zincum.—An especially useful remedy in old chronic cases. It tends to correct the cerebral anæmia brought about by the excessive use of bromide of potassium. Loss of memory, great aversion to mental work. Aching in nape of neck from mental exertion or writing. Great weakness, coldness of extremities.

Calcarea phosphorica.—A fine constitutional remedy in old cases where nutrition is manifestly defective. It especially aids development in young growing people, and, with Magnesia phosphorica, is one of *the* remedies for the anæmic headaches of school-girls. Retarded dentition and bone-formation point to this remedy. One of the remedies for hydrocephaloid.

Helonias.—Of use when the anæmia has its starting-point in the female sexual apparatus. Congestion or hyperæmia of these parts has given way to one of anæmia and bloodlessness.

Remedies bearing on complications: *Sulphur*, psoric taint, a valuable intercurrent remedy; *Mercury*, syphilis; *Calcarea carbonica*, scrofulosis, tendency to glandular enlargements.

Remedies to be consulted: Hepar, Conium, Natrum muriaticum, Phosphoric acid, Rhus tox.

Auxiliary Treatment.—Salt-baths are useful in most cases of anæmia, and sea-bathing and the invigorating change with which it is usually associated cannot be too highly recommended. Electricity, especially the galvanic current, is one of the most important and satisfactory agents that can be employed in the treatment of cerebral anæmia. The recumbent posture is in very bad cases absolutely essential to bring about a recovery. Mitchell's "rest treatment" in this connection has already been mentioned. Dr. Allen McLane Hamilton recommends nitrous oxide gas in cerebral anæmia associated with depression of spirits and even decided melancholia. Nitrite of amyl may also be used in sudden attacks of fainting, when the very bloodless condition of the patient makes a speedy reaction desirable.

ENCEPHALITIS.

Definition.—An inflammation of the brain substance, usually complicated with meningitis.

Ætiology.—It is more common in old age and in the male sex. Abuse of alcohol, sexual excess, nervous exhaustion from mental overwork, shocks, intense excitement, sunstroke, or exposure to extreme heat may excite the disease. It may follow disease of the internal ear, attacks of erysipelas, scarlet fever, small-pox, or other eruptive diseases in which the vitality is lowered or the disease can be developed by extension of inflammation. Injury is one of the most important causes.

Pathology.—There is quite a disposition to the formation of abscesses, which are generally located about several inflammatory centres, most frequently in the gray matter of the cerebrum, the cerebellum standing next in frequency. The corpora striata and optic thalami are commonly involved. In post-mortem examinations a greenish-yellow pulpy matter is found. Sometimes the pus is found encysted. If an abscess forms near the surface of the brain, its tendency is to extend outward; if in the interior, it may open into one of the ventricles. Sometimes pus finds its way out through the ear, and sometimes through the cribriform plate into the nose.

Symptomatology.—The first symptoms are vertigo, headache, noises in the ears, disturbance of vision, numbness, and difficulty of articulation. Then come pains in various parts of the body, followed by anæsthesia. The headache is constant from beginning to end, and is limited to no particular spot. There are flashes before the eyes, photophobia and contraction of the pupils; the conjunctivæ are suffused, and there is aching of the eyeballs. At a later period the pupils dilate and vision is lost, as a result of optic neuritis. At first the hearing is very acute, subsequently it is impaired, and finally lost. Jerking and twitching of the facial muscles are common and last for several days. In the first stage there are convulsions which are generally limited to the face or limb of one side of the body. At length a unilateral paralysis appears, which is likely to extend until complete hemiplegia results. From the commencement of the paralysis there is a shuffling gait, for owing to paralysis of extensors of the leg and toes, the patient cannot raise his toes, but drags his foot and acquires a habit of swinging it outward as he brings it forward in walking. To steady himself, he spreads his feet, but bends his knees instead of stiffening them as is observed in locomotor ataxia. Ptosis is common, and, because of anæsthesia, the tongue is often bitten, both on the sides and on the end. From the weakness of its muscles he becomes easily tired in talking.

The first indication of mental failure is a want of control of the emotions. The patient laughs inordinately at nothing, and in a moment may be sobbing and crying without being able to stop. Memory, especially of names, begins to fail, and the weakness increases until dementia ensues with or without a previous mild delirium. From the beginning there is a characteristic tremulousness of pulse; constipation, also, is pretty constant. The breathing becomes irregular, loud, and stertorous. The temperature never exceeds 103°, and is generally lower. Because of the anæsthesia of the mucous membrane of the mouth and pharynx, the patient can not judge correctly of the quantity or location of food in the mouth, and chokes frequently. There is gastric trouble throughout the disease, and from paralysis of the bladder there may be retention of urine, or if the sphincter vesicæ is paralyzed, there may be constant dribbling. Death occurs from exhaustion or asphyxia, or from the bursting of an abscess into one of the ventricles or upon the surface of the brain.

Diagnosis.—The diagnosis is difficult in the first stage of the disease. Cerebral hæmorrhage and meningitis are the diseases most likely to be confounded with it. In cerebral hæmorrhage the attack is sudden; in encephalitis it is more gradual. In meningitis the delirium is more acute and violent, and the headache is more intense, the delirium of encephalitis being mild and the headache dull. It can scarcely be confounded with any other trouble.

Prognosis.—Death from exhaustion is the usual result, and the prognosis is very unfavorable in all cases.

Treatment.—*Hygienic.*—For a suspected case, a good nutritious diet, an abundance of fresh air and sunshine, and a dry, warm, genial climate are advantageous. The more good red blood the patient has, and the more his physical strength can be kept up, the better are his chances of successful resistance to the disease.

Therapeutics.—**Belladonna.**—At the onset, when the face is red and the head hot, the eyes injected, and there is marked photophobia. The headache is intense and beating, the carotids throb, and there is delirium. Also when there is active inflammation of the internal ear.

Mercurius iod.—In syphilitic subjects or when there is a history of rheumatism, chronic otorrhœa, enlarged tonsils, with an aggravation of the symptoms from a change of weather or at night.

Pulsatilla is indicated when brain trouble follows the suppression of a chronic discharge from the ear, or when an eruption has been driven in by cold or exposure.

Silicea may be given when an abscess is supposed to have formed.

Zincum may be used in the later stages when there is great depression of body and mind; the jaw drops, there is restlessness of the feet, the skin is cold, and the pulse weak and feeble.

TUBERCULAR MENINGITIS.

Synonyms.—Acute meningitis, Acute hydrocephalus, Hydrocephalus internus.

Definition.—By tubercular meningitis we mean an acute inflammation of the membranes of the brain, associated with, or dependent upon, a growth of miliary tubercles.

Ætiology.—Tubercular meningitis is one of the modes of expression of the tubercular diathesis, and is usually the offspring of scrofulosis. It may appear during the second year of life, but is more frequent between the second and seventh years. When it occurs in adults it is most liable to make its appearance between the eighteenth and thirtieth years. At all times of life males are more subject to the disease than females. Insufficient food, foul air, and a failure to observe proper sanitary requirements favor its development.

Pathology.—All evidence goes to show that the granulations present in this disease are tubercular in character. They are located mainly in the pia mater, which is always found more or less inflamed and thickened and covered with purulent matter. They are usually confined to that part of the pia mater covering the base of the brain, and this is probably the explanation of the derangement of motility observed in this disease. They are also distributed along the middle meningeal arteries. The ventricles are distended with serum, either clear or bloody, and occasionally the septum lucidum is ruptured by purulent fluid. In subjects of this disease, tubercular deposits are also commonly found in the lungs and abdomen.

Symptomatology.—There are four well-marked stages: 1, that of invasion; 2, excitement; 3, depression; 4, recurrence.

The stage of invasion may be wanting in some cases. It consists in a change in disposition, the patient becoming irritable, a rapid loss of flesh, not in the face, but in the body and limbs; constipation and slight fever. This stage may last from a few days to two months.

The second stage is ushered in by obstinate vomiting and pain in the head, so intense that the child puts its hands to its head and screams frequently; it awakens at night with a sharp shriek; convulsions occur and may be repeated several times; the fever rises and becomes persistent; the pulse quickens, but is soft and compressible; the tongue is usually coated in the centre and red at its edges; the temperature ranges from 101° to 103°. Trousseau has called attention to the "cerebral stain," a name given to a red line on the abdomen or thorax, produced by drawing the finger nail lightly across the skin. It appears after a few seconds and remains for some time. The vomiting and headache, however, are the main symptoms.

The pulse, which has been about 140, now drops to 80, or even 50; its beats are quick, but the interval between them is long. The temperature is reduced throughout this, the third, stage. The child sleeps a great deal, is slightly delirious, and lies on its back with its eyes fixed. A loud noise attracts attention, but there is no apparent recognition of persons or surroundings. There is constant working of the fingers, picking at the bedclothes, or grasping at imaginary objects. The head is turned from side to side upon the pillow, and there are frequent convulsions, though they may not be general; there may be only strabismus or spasms of the muscles of the mouth. When awake, headache is complained of, and the peculiar scream or hydrocephalic cry is frequently made. The face is pale and cold, and the conjunctivæ injected. If able to walk, the child drags its feet and staggers. The vomiting ceases, respiration becomes irregular, sometimes rapid and sometimes slow, and sighs are frequent. This stage lasts from two or three days to two weeks.

During the fourth stage the fever returns and the symptoms are more violent. The change is more marked because the child appeared to be improving. The convulsions are more frequent and severe, and the head is drawn back until opisthotonus is produced. Paralysis begins in some portion of the body, and extends until it becomes general. Delirium and stupor interchange until coma and death ensue. The pulse rises and a cold sweat breaks out before death.

The disease is not confined to children, but may occur in adults, with the same train of symptoms.

Diagnosis.—In simple meningitis the onset is sudden, while in the tubercular variety it is more gradual and insidious. Simple meningitis pursues a regular course, while tubercular remits. In the simple form the temperature rises several degrees, in the tubercular only one or two. The former is not hereditary, while the latter is.

In typhoid fever there may be vomiting and headache, but the bowels are not constipated; there are tenderness in the cæcal region, swelling of the spleen, epistaxis, and, perhaps, an eruption.

Worms may cause symptoms resembling this disease, but a history of the case will enable one to make a distinction between the diseases.

In hydrocephaloid, a condition named by Marshall Hall, there is a history of great exhaustion and depression from the beginning that are not present in hydrocephalus. In the former disease the posterior fontanella is sunken.

Prognosis.—Dr. Hughes says that in eighteen years of practice he never saw a case recover after effusion had set in. Hammond says he never saw a case recover. Although the outlook is gloomy enough in fully developed cases, yet much can be done toward preventing the disease, and toward arresting it in its incipiency.

Treatment.—*Preventive.*—In a case where development of this disease is feared, *Calcarea phosphorica* should be administered continuously for months. If there should be general glandular enlargements, or hypertrophy of the tonsils, Calcarea iod., with an occasional dose of Sulphur as an intercurrent remedy, should be given.

Hygienic.—A child who has a predisposition to this disease should be taken out of doors, a few days after birth, and kept in the fresh air the greater part of the twenty-four hours of each day. It should live in a dry climate, at a high altitude, and in a bracing atmosphere. It should be treated exactly as if the case were one of threatened consumption. The body should be kept clean, and its strength and vigor kept up by good, substantial, nourishing food.

Therapeutics.—**Belladonna.**—Injection of the eyes, contraction of the pupils, redness and heat of the face, heat of the head, rolling of the head backwards, squinting of the eyes, violent throbbing of the carotids. The child starts when just about falling asleep: especially useful when trouble is developed during dentition.

Veratrum viride.—High fever, great thirst, great twitching and jerking of the muscles of the face, eyes and extremities. Should be given also when a malarial influence is suspected.

Bryonia.—Should be administered when effusion is feared. Child screams with pain in the head, every movement is intolerable, and there is suppression of, or very scanty, urine.

Cuprum.—Violent convulsions of an epileptiform character, loud screaming, grinding of the teeth. Metastasis during an attack of exanthematous fever. Stage of exudation.

Helleborus nig.—Strabismus, heavy sleep, with frequent spells of screaming. Lower jaw hangs down, chewing motion of the mouth; urine scanty and dark, with coffee-ground sediment.

Zincum.—At the last stage of the disease: constant rolling of the head from side to side. Restless moving of the feet, jerking and screaming during sleep. Extreme mental and physical depression.

Pulsatilla.—When the disease has been developed from suppressed measles.

Bryonia.—If after measles Pulsatilla should not relieve, and there should be suppression of urine.

Auxiliary Treatment.—In the first stage, when the head is hot and the pupils are contracted, and the child is restless and irritable, cloths wrung out of cold water or the ice-bag applied to the head are valuable. At a later stage hot cloths will be more serviceable. Beef-tea, milk, eggs, and other nutritious diet should be given from the commencement. If convulsions should prevent feeding by the mouth, beef-tea, milk, wine, and other preparations of food may be introduced into the rectum by means of hollow suppositories.

PACHYMENINGITIS.

Definition.—By this term is meant a meningitis secondary to inflammation of the bone, one of the common results of injury of the head.

Ætiology.—Blows, falls, or any other means of injury; also syphilis and cancer.

Symptomatology.—For several days after the receipt of an injury there is no complaint made by the patient, but after a variable period his head begins to ache, he is hot and cold alternately, and loses his appetite. He grows worse, his temperature rises, and he becomes stupid and drowsy. If the retina be examined with the ophthalmoscope, its vessels will be found tortuous and swollen. If the trephine be used, a small quantity of bloody pus is usually found in the diploë. If the trephine is not used, an abscess may form, all the membranes become involved in the inflammation, and a very unmanagable pyæmia result. With the formation of abscess rigors will be experienced, and the case will ordinarily end in death.

Diagnosis.—Fever, headache, and stupidity, with a history of injury, will strongly indicate the existence of this disease.

Prognosis.—If the trephine is used early enough, the depressed bone raised, and the stupor and fever abate, the chance for recovery is good. Otherwise the prognosis is bad, and a fatal termination may be expected.

Treatment.—After the injury the head should be kept elevated and cold water or the ice-bag applied. The patient should be kept perfectly quiet in a dark room, free from noise or disturbance. If the skull has been depressed, the trephine should be used at once. *Arnica* should be employed locally and internally. If there are fever and delirium, *Aconite* is indicated.

If there has been no injury, and the disease is supposed to be caused by syphilis, Mercurius should be the remedy employed. Iodum and Plumbum are suggested by Bähr, and Jousset recommends Nux vomica.

APOPLEXY.

Synonyms.—Cerebral hæmorrhage, Apoplectic stroke.

Definition.—A rupture of a vessel of the brain, and the consequent passage of blood into the cerebral substance or into the ventricular cavity, constitute the disease known as apoplexy.

Ætiology.—An important predisposing cause of apoplexy are those diseases of the bloodvessels which make their appearance with old age. Apoplexy is most common between the age of forty-five and sixty; men are more subject to it than women, and it occurs more often in the winter. Hereditary influences play quite an important part; frequently two or three, or more, members of a family die of it. Disease of the left or of the right side of the heart is often a factor in its production. Abuse of alcohol, or of other stimulants, excessive use of opium, overheating, and especially emotional excitement during eating, excessive physical exertion, anger, worry, and straining at stool have led to apoplectic seizures. In some cases the vessels are injured during childbirth, thus creating a most potent predisposing cause. Tight clothing about the neck, any occupation that requires the head to be kept low for long periods of time, the sudden arrest of the menstrual flow or of a customary hæmorrhoidal discharge, the existence of gout or of syphilis may produce it. Whatever increases the flow of blood to the head or prevents its return, tends to produce cerebral hæmorrhage, especially in gouty, syphilitic, or chlorotic persons.

Pathology.—An extravasation of blood is found either in the cerebral substance or in the ventricular cavity. Some clots are of the size of a small pea, others as large as a small apple. The rupture ordinarily takes place about the corpus striatum, optic thalamus, or pons Varolii. Sometimes, but rarely, it occurs in the medulla oblongata. It is found on the right side more frequently than upon the left, and blood escapes into the ventricles in about one-half the cases. The extravasated blood, instead of separating into serum and a clot, as it does in the open air, remains in a mixed condition and assumes a gelatinous appearance. In about a week the serum is absorbed, and the clot contracts and becomes hard. It is black at first, but later becomes yellow, and, no matter how thoroughly the patient may recover, it never entirely disappears. One of the most common diseases of the cerebral arteries is chronic endarteritis which renders the vessels brittle, less elastic, and more readily broken by a severe strain. At the point of rupture fatty degeneration of the artery has also been observed, and minute miliary aneurisms often follow inflammation of the arteries. Probably a majority of cases occur from a rupture of one of these little aneurisms.

Symptomatology.—Before a regular attack takes place, the person has commonly certain preliminary symptoms which are in all probability due to cerebral congestion. These are difficulty of articulation, twitching of the muscles of the face, dark spots before the eyes, epistaxis, numbness of one side of the body, headache, vertigo, and tendency to sleep. Sometimes vomiting occurs, and confusion of the mind is pretty constant. Then, all at once, while talking or sitting in a chair, he falls unconscious to the ground. Motion and sensation are abolished, the breathing is stertorous, the lips and cheeks being puffed out in expiration, the pupils are dilated, and the action of the heart is slow and labored. The power of swallowing is lost, and the bladder and rectum act involuntarily. In severe attacks death ordinarily occurs without a return to consciousness.

In milder attacks the patients have a sudden sense of confusion and vertigo, and then fall to the ground. The muscles of the lower limbs and face jerk and twitch for a few moments, and consciousness slowly returns; examination shows that one side of the body is paralyzed. After a few hours, patients recognize those about them, and their mental condition improves gradually. A patient of mine, a prominent man in this city, after an unusually hard day's work slept well, but discovered in the morning that his face looked odd and that his lips and cheek on one side were numb. I told him he had had a slight apoplectic seizure, and that it was necessary to stop business at once. Upon my advice he went to the country to recuperate, but in spite of my warning concluded to repair the fence on his country place. One night about three o'clock, having done an unusual amount of work on the preceding day, entertaining in addition some friends in the evening, he had another attack, and died in six hours. If he had avoided over-exertion, his life, in all probability, would have been prolonged for a number of years.

After an attack, the tongue is paralyzed on one side and on protrusion it is deflected toward the sound side. In a majority of cases the paralysis is on the side opposite to the lesion. A peculiarity in some cases is a turning of the eyes toward the sound side. Tonic contraction of the muscles is a common symptom. After a seizure is over, the patient's mind is radically changed. He becomes irritable and fretful, and frequently forgets the ordinary proprieties of life. There is great impairment of memory, and the emotional faculties are especially affected. The patient is easily moved to tears, and the slightest provocation induces inordinate laughter. After a time the speech begins to improve, and the patient gradually regains power over the paralyzed muscles. The leg improves faster than the arm, but the gait is peculiar. Owing to the paralysis of the extensors, a swinging of the foot outward is necessary in bringing it forward in walking. The arm is usually held rigid at the side of the body. Trousseau asserts that in cases in which the arm recovers before the leg, the patient is sure to die. In addition to the loss of motor power on one side, sensation is impaired, and the temperature of the affected side is lowered. Imperfect circulation of the blood probably has something to do with this as well as with the atrophy which is present.

Varieties.—As indicated by the symptoms described, there are two distinct varieties, although both are due to the same cause, and differ only in degree. In the first, or apoplectic, there is unconsciousness, with stertorous breathing and puffing of the cheeks. In the second, or paralytic, hemiplegia is the prominent symptom, there being little or no loss of consciousness.

Diagnosis.—The diagnosis of apoplexy is not ordinarily difficult, yet it is sometimes necessary to distinguish between it and compression of the brain from injury, congestion, an epileptic fit, alcoholism, or narcotic poisoning. Profound stupor may also result from embolism, thrombosis, or a tumor, but a careful examination will generally reveal the true condition. If due to injury of the skull, outward signs are commonly present; if to alcoholism, the breath will indicate it. Most drunken persons can be aroused, and there is generally no pupillary change. In narcotic poisoning there is contraction of the pupils. A bitten tongue would indicate epilepsy, while in a well-marked case of apoplexy we find stertorous breathing with puffing of the cheeks and dilated pupils; and an examination generally shows one-sided paralysis.

Prognosis.—A majority of severe attacks result in death after a few hours. If a patient lives four or five days after a seizure, the chances are in favor of recovery. An irregular, rapid pulse, involuntary action of the bladder and rectum, or a cold skin are unfavorable signs. If, after an attack has lasted a few hours, the coma increases, death is almost certain. Old age or debility render the prognosis bad. In lighter attacks, where consciousness is not lost, the prognosis is more favorable. If the temperature continues for any length of time above 100°, the outlook is bad; if it rise to 103° or 104°, death is certain. As regards the paralysis, the longer it has lasted the less is the probability of recovery of the use of the members.

Treatment.—If the subject complains of headache, vertigo, double vision, difficult articulation, and other premonitory symptoms of cerebral trouble, remedies should be selected to prevent further development of the threatening difficulty. In the first place, the patient's mode of living should be regulated; he should, as far as possible, be relieved of all mental worry and anxiety. He should obtain good rest and refreshing sleep. His food should be plain and substantial, and water should be his principal drink. Stimulants should be prohibited, and all excitement avoided. Both the mind and body of the victim of apoplexy are irreparably damaged, and no matter how complete his recovery, comparatively speaking, he is never quite as well as before the attack. Two principal remedies should be given as indicated at this stage. I refer to Nux vomica and Phosphorus. Nux should be given to literary people and to those of sedentary habits; frontal headache, constipation, gastric and hepatic troubles point to this remedy. The subjects are usually those who have lost sleep and rest, and stimulated inordinately to sustain the effort.

Phosphorus.—To be administered to persons threatened with cerebral congestion and perhaps hæmorrhage. When there is reason to suspect the existence of inelastic, brittle, cerebral vessels, the indications point in the direction of a run-down nervous system. Hereditary predisposition to brain trouble, cough, and night sweats, nervous prostration from excessive intellectual labor and sexual excesses call for this remedy.

Aconite is to be used when the patient seems in imminent danger of apoplexy. The subject has a full, bounding pulse, and is exceedingly thirsty and restless. He complains of headache, numbness, formication, and other symptoms of disturbed circulation. No better remedy can be given in a case of threatened cerebral hæmorrhage than Aconite. It lessens the heart's action, relieves the strain on the already overtaxed vessels, and quiets and subdues the nervous symptoms due to excessive cerebral pressure.

Belladonna.—If the symptoms persist, the throbbing of the head increases in severity, the head becomes hot and the face red, the eyes injected and the pupils contracted, then Belladonna should take the place of Aconite.

During the seizure the head should be elevated at once in such a way that there will be a gradual incline from the waist to the occiput. This lessens at once the force of the heart. All constricting clothing should be removed or loosened, the room should be kept quiet, and, as a rule, cold water or the ice-bag applied to the head. If the stupor should last over twelve hours, beef-tea should be injected into the rectum. If stupor is profound, with bluish face and occasional epileptiform seizures, Opium should be given. These common-sense measures should be employed until consciousness returns. Then the patient should be kept perfectly quiet in body and mind for several weeks, and should have substantial, non-stimulating food, until there is reason to believe that all danger from cerebral hæmorrhage has passed.

After the patient has recovered from the seizure, and the mind is clear once more, attention should be given to the restoration of the motor and sensory powers. One of the first measures to be employed is massage, administered two or three times daily by an experienced masseur. Considerable benefit may be had from friction with the flesh brush and salt water, and from the interrupted Galvanic current. Throughout the trouble the patient should have substantial, blood-making food and proper medication.

Of the remedies likely to prove serviceable, *Nux* and *Phosphorus* stand at the head; their indications have been given. *Zincum* is valuable when the mind has suffered more than the body, mental depression and loss of memory being well pronounced. *Arnica* is to be considered if an injury has been suffered. Other remedies possibly useful are: *Causticum*, Cocculus, *Plumbum*, Rhus tox., Sulphur.

Moderate exercise in the open air and change of scenery are to be commended if within the power and ability of the patient.

APHASIA.

Definition.—Aphasia is manifested by loss of memory of words or of their expression in articulate language, and is due to disease of the brain.

Ætiology.—Aphasia is caused by anything that produces irritation of, or pressure upon, the third frontal convolution, in the island of Reil, along the course of the middle cerebral artery of the left side; thus it may be brought about by an embolus, a thrombus, a narrowing of the artery or one of its branches, a hæmorrhage, an abscess, a tumor, or any other growth at this point.

Pathology.—Broca first discovered that irritation of this particular spot in the island of Reil caused aphasia, and post-mortem examinations made since then have confirmed this claim.

Symptomatology.—The disease is usually sudden in its development—always so when caused by embolism or hæmorrhage. If due to thrombosis or a narrowing of the artery, its development is more gradual. There is an inability to use the ordinary terms of expression. In serious cases only one or two words may be used. For instance, a patient may say "No" to everything that is said to him. The intellect is comparatively unimpaired, the patient being fully aware of his defect, but unable to remedy it.

In the majority of cases there is some right-sided hemiplegia. Right-sided convulsions may occur, and leave a condition of aphasia and right-sided paralysis. There may be no paralysis whatever, but only a simple sense of confusion, or a faint, and the subject finds himself unable to express himself properly, using, as already indicated, one or two words for everything he wishes to say. If he wants his supper, or desires to go down-town, he may say "boot"; he knows better, but is obliged to use that word if he opens his mouth to express himself.

Varieties.—There are three varieties:

1. The amnesic, characterized by an inability on part of the patient to recollect words necessary to express his ideas.

2. The ataxic, consisting in an inability to articulate the words he may desire to use.

3. The agraphic, an inability to *write* the words the patient wishes to use in order to express his ideas.

Diagnosis.—This is generally easily made, because there is no other disease that closely resembles it. Apart from what has been mentioned, the intellect is not greatly impaired, except in cases due to abscess or hæmorrhage, where a larger portion of brain substance is disturbed. The subject is never entirely as well as before the injury, but, comparatively speaking, the mind is clear.

Prognosis.—In uncomplicated cases the prognosis is usually good, so far as danger to life is concerned. Simple cases usually recover after a time; but where the trouble is secondary to some organic disease of the brain, the prognosis should be guarded.

Treatment.—Little is to be said concerning the use of drugs in this complaint, for we have, generally, foreign bodies to deal with which cannot, ordinarily, be removed. The patient should have good food, fresh air, sunlight, and comfortable surroundings. Disease of the heart or kidneys should be looked for and removed, if possible. If a clot has come up from the heart and has, by its lodgment, caused aphasia, treatment should be directed to that organ with a view of preventing a recurrence of the trouble. By careful practice every day a patient can do much toward overcoming this difficulty, and if there is no new accession to the trouble, recovery is quite probable. A patient of mine became aphasic several years ago, but by constant practice and patience she now talks as well as she ever did.

DEMENTIA PARALYTICA.

Definition.—A gradual progressive muscular paralysis accompanied by a gradual and progressive decay of the mental powers.

Ætiology.—The subjects are mostly men, and the disease usually manifests itself between the ages of thirty-five and sixty years. The excessive use of alcoholic liquors, too free sexual indulgence, prolonged mental strain, worry, and anxiety are supposed, and with good reason, to be exciting causes of the difficulty under consideration. Injuries of the skull have appeared to develop it, and an inherited predisposition, in some cases, seemed to have been at the bottom of the trouble.

Pathology.—There is very little known of the organic changes to which are due the symptoms of general paralysis. Degeneration of nerve-cells, and a fatty, shrunken condition of the sympathetic ganglia, spinal cord, and cortical substance of the brain, are observed in most cases on making post-mortem examinations. Organic changes in the membranes of the brain, with thickening and congestion of the cerebral substance, are also described and given as causes of this difficulty.

Symptomatology.—The symptoms may be divided into those affecting the muscular system and those affecting the mind.

1. *Those Affecting the Physical.*—An early symptom is difficulty of articulation. Tremulousness of the upper lip under simple emotional excitement, and fibrillary trembling of the tongue when protruded, are marked symptoms at an early stage of the trouble. The symptoms, as regards articulation and gait, closely resemble, at this period, the talk and manner of walking of the drunken man. Epileptiform seizures and attacks of cerebral congestion are commonly observed throughout the disease. Inequality of the pupils is present throughout the difficulty, but comes and goes irregularly. Gradually, but surely, the paralysis increases until the patient is finally reduced to a condition of perfect helplessness. Bed-sores are apt to occur at this time, and both annoy and reduce the vital powers of the subject.

2. *Symptoms Affecting the Mind.*—The mental symptoms usually become manifest before the physical; but sometimes the physical are observed first. Sleeplessness is one of the first of the mental symptoms. This is followed in a short time by fits of depression and great despondency, even to melancholia of a marked type. The memory becomes impaired, the patient fretful and irritable, and the reasoning powers very much enfeebled. A subject of this disease, if contradicted or offended in any way, immediately becomes angered and enraged, and attempts to convince by violence, instead of appealing to the

reasoning faculties of his hearer. The mental depression continues for a variable time, and then is followed by a condition of exalted mental excitement. During his depressed state he was markedly penurious and stingy with regard to money-matters, and over-careful and suspicious in every way; now he becomes good-natured, cheerful, and extravagant in his ideas; his desires and wants may not be in keeping with the condition of his pocket-book, but that is a small and quite insignificant matter to him, and he is, therefore, continually engaging to buy out gold-mines, lines of steamboats and railroad companies in wholesale lots. Everything he projects is to be done on a grand scale. The magnificent gardens he is about to establish, filled with countless beautiful women, thousands of elegantly caparisoned horses, bands of music, and in which lordly processions are to take place daily, are favorite topics with him. He imagines his wealth and power to be unlimited, and when almost hopelessly paralyzed he will constantly brag of his great strength, his powers of endurance, and fleetness of foot. This mental extravagance usually keeps up to the last. Attacks of maniacal excitement frequently take place, and after each one he is manifestly much worse. Remissions of all the symptoms occur irregularly throughout the trouble, and during these the patient appears to be greatly improved, but they are deceptive.

This is the history of this disease, and the careful physician should not be deceived by these temporary periods of apparent improvement. From bad to worse is the rule, and with mind and body gone, death ends the scene.

Diagnosis.—This disease can scarcely be confounded with any other difficulty, except, perhaps, chronic alcoholism; and even here the history of the difficulty will at once determine the true nature of the complaint.

Prognosis.—Cases of recovery are rare. The disease may terminate in a few months, or last six or seven years. Before the end comes, the subject takes to his bed never to walk again; bed-sores form, eating becomes almost impossible, respiration is labored and difficult, and he finally dies from asphyxia, exhaustion, or some intercurrent malady.

Treatment.—There are reported cures of this disease, but few of these were confirmed cases, with possible errors in diagnosis. However, with the progress now being made in medicine, much that is bright and hopeful may be looked for in the near future, not only for this hitherto intractable complaint, but for a host of others that are now so difficult to manage. Hughes recommends Belladonna and Cannabis indica; also Mercurius corrosivus and Iodide of potassium. Hart suggests Belladonna, Glonoin, and Phosphorus. I have seen Mercury clear up suspicious symptoms a number of times, but never knew any of the above remedies, nor indeed any others, to give the satisfaction expected of them.

SENILE DEMENTIA.

Definition.—A condition of mental decay, associated with, and mainly due to, old age.

Ætiology.—This affection commonly follows cessation from active business life. While the brain is active, the mind seems clear and vigorous; but reaction takes place on ceasing to do the accustomed amount of brain-work, and manifests itself in the failure of the mental powers. Senile dementia is due to decay of the mind, and is, perhaps, the natural result of excessive mental work.

Symptomatology.—Loss of memory is one of the first and most prominent symptoms. The subject may be fretful or cheerful and good-natured. The mind is weak, indeed often so feeble that the patient cannot understand the simplest matters. Every-day events are not comprehended, or scarcely so, while taking place. His mind dwells upon the past and, as a consequence, he frequently talks of matters that occurred years ago as though they had happened yesterday. Unaware of the facts in the case, he holds imaginary conversations with people that have been dead for years. He lives in the past, and confounds the things of the present with those of long ago, while his feeble mental state makes it impossible for him to understand the true state of things even when explained to him.

Diagnosis.—The disease is readily recognized, and a mistake can scarcely be made if ordinary care and judgment are exercised. The prognosis is unfavorable.

Treatment.—Supporting treatment in the way of nutritious food is about all that can be done in most cases, especially if the subject is very far advanced in life.

Acidum phosphoricum.—Is sometimes of service, particularly if sexual excesses have been habitual with the patient.

Anacardium is indicated when there is extreme loss of memory.

Zincum.—Great mental depression. Cold skin, restlessness of the feet.

HYPERTROPHY OF THE BRAIN.

Definition.—By hypertrophy of the brain we mean a condition in which the encephalon is increased beyond the normal, both in bulk and in weight. If such a brain be removed from the skull, it expands so that it is difficult to replace it in the cavity.

Ætiology.—Hypertrophy is sometimes brought about by tumors or other morbid growths. It may be a disease of intra-uterine life, but is ordinarily observed after birth, it being most frequent in children affected with rickets. Some forms of encephalocele are possibly due to true hypertrophy of the brain. The conditions favorable to the development of this disease are the state of infancy, inherited weakness of constitution, foul air, improper food, and repeated attacks of congestion of the head brought about by the concussion of coughing. It is supposed that lead-poisoning is sometimes a cause.

Pathology.—Examination after death shows that the membranes are dry, and the brain itself is pale and bloodless, its sulci having to a great extent disappeared. On cutting through the brain-substance, it is found to be tough, and it is seen that the disease is located on the convex surface, affecting most seriously the posterior lobes. The increase in bulk affects the white matter especially, and this is found to be of an elastic consistency; the real lesion is hypertrophy of the connective tissue. In advanced cases the inner table of the skull may be absorbed and even perforation take place.

Symptomatology.—Convulsions are the first symptoms observed, especially if the fontanelles have closed and expansion of the brain is prevented. Other symptoms are headache, photophobia, paralysis, anæsthesia of limbs, vomiting, and, at a later stage, apathy and a tendency to stupor.

Diagnosis.—This should not be difficult, as there is no other disease which very closely resembles it.

Prognosis.—Bad; although in rickety children the course may be chronic and the patient may live for an indefinite length of time.

Treatment.—So far, no treatment has had any effect in overcoming the disease. Calcarea carb., Calcarea iod., Phosphorus, and Sulphur should be consulted.

ATROPHY OF THE BRAIN.

Definition.—By this term is meant an abnormal smallness of the brain, which may be due to atrophy of an already developed brain or to an arrest of growth of this organ.

Ætiology.—The condition may be congenital, and due to arrest of development during fœtal life, or after the brain has been developed atrophy may occur from a variety of causes. It is generally observed in old age, but may follow wasting diseases in early life. A common cause is insufficient quantity and poor quality of blood supplied to the brain. It not unfrequently results from repeated attacks of delirium tremens; in such cases it may be acute, running a rapid course and terminating in death. It often depends upon hæmorrhage, inflammation of the brain-substance, or upon some mental diseases. Atrophy of portions of the brain is caused by the pressure of tumors and other morbid growths.

Varieties.—There are three well-known varieties: 1. Congenital; 2. Primary; 3. Secondary, which is either general or partial.

Pathology.—The brain presents different appearances in the different varieties. In primary cases, *i. e.*, those not due to some other disease, the brain has a shrunken appearance, the nerve-tubes are diminished in calibre, the cells are smaller, and the arteries are contracted. In the secondary variety there are traces of fatty degeneration with the neuroglia either wanting or in a condition of sclerosis. If the atrophy is general, the convolutions are shrunken and the fluid in the subarachnoid space is increased in quantity; if partial, there are depressions in the hemispheres, with localized hæmorrhage or patches of softening, due, in all probability, to thrombosis or embolism, the products of which have been absorbed.

Symptomatology.—The symptoms vary according to the seat and extent of the atrophy. In most cases there is mental apathy with a tendency to imbecility. Loss of memory, mental sluggishness, hesitating speech, with difficult articulation, epileptiform convulsions, paralysis, and contraction of limbs are common. When the atrophy is secondary to some brain disease of limited extent, such as embolism, thrombosis, or morbid growths, the symptoms may be limited to a difficulty of speech, strabismus, or other slight manifestations of disease. In congenital cases the intellect is weak, almost idiotic; one side of the body is paralyzed; the muscles, nerves, bloodvessels, and bones are atrophied; one or more of the limbs is contracted; epileptic convulsions are common; and the general condition is much below normal.

Diagnosis and Prognosis.—The diagnosis depends upon a recognition of the symptoms described; the condition being well-marked, it cannot readily be confounded with any other disease. The prognosis is bad.

Treatment.—The efforts of the physician are limited to means to sustain the strength of the patient to the fullest extent possible.

THROMBOSIS OF CEREBRAL ARTERIES.

Definition.—A narrowing of the calibre of an artery of the brain by the deposition of fibrinous matter on its inner surface. The fibrinous deposit is called a thrombus.

Ætiology.—Thrombosis may result from atheroma or endarteritis, by which the elasticity of the artery is diminished and its inner surface roughened. A roughened or diseased spot in a vessel may form a nucleus for the deposit of fibrin. Rheumatism, excessive use of alcohol, or of starchy foods, favor the formation of thrombi. Very severe and prolonged mental exertion, by impairing the tone of the vessels, also conduces to the disease. Suppression of habitual discharges, excessive emotional disturbance, or injuries to the head, as well as pressure upon a vessel by a tumor, or heart diseases, especially those affections of the heart which lead to irregularity in the heart's action, are important ætiological factors. Thrombosis of cerebral arteries is more common in men and in the advanced period of life.

Pathology.—Post-mortem examinations of persons who have died of this disease show numerous small fibrinous clots at roughened or atheromatous points of the vessels. Evidences of endarteritis or atheromatous degeneration are commonly found. The parts to which the affected vessels are distributed are found anæmic, while there is a congestion of tissue behind the points of obstruction. The seat of the anæmia is usually surrounded by a red border. The arteries most liable to be affected are the middle, cerebral, vertebral, and basilar.

Symptomatology.—The disease is developed gradually. Headache is constant; the pupil of the affected side is frequently dilated, and ptosis and strabismus are commonly observed. Difficulty of articulation and loss of memory of words are frequent. Paralysis begins shortly after the first symptoms are observed, and gradually increases; it affects first the leg, then the arm and face, and results finally in complete hemiplegia. From the beginning there are impaired sensibility, numbness and tingling of the part, ultimately resulting in paralysis. The mental condition is characterized by the loss of memory already mentioned, and tends to a condition of apathy, with great inclination to sleep. In talking there are hesitancy and stammering, and it is apparent to the most ordinary observer that the integrity of the mind is greatly impaired.

Diagnosis.—Arterial thrombosis is distinguished from congestion of the brain by the comparative intensity and continuity of the mental symptoms, and by the, usually, more advanced age of persons suffering from the former affection. Paralysis sets in early, and tends to show the true character of the disease. In cerebral hæmorrhage the onset is sudden, while in thrombosis the development is gradual.

Prognosis.—The prognosis is unfavorable, as the tendency is to complete obliteration of the affected vessel, with subsequent cerebral softening.

Treatment.—The treatment is exceedingly unsatisfactory, the cause of the disease depending upon the presence of foreign matter which lies beyond the reach of remedies or surgical agencies. The presence of rheumatic affections, of derangements of the heart, or of any other condition amenable to treatment, suggests at once an attempt to remove or to modify such states.

EMBOLISM OF CEREBRAL ARTERIES.

Definition.—By embolism we mean the formation of a clot in some portion of the body and its transportation along the current of the blood and subsequent closure of a vessel at a point where it is too small to allow its further passage.

Ætiology.—One of the most common causes is a rheumatic condition, which, by setting up an acute endocarditis, favors the formation of clots on the valves of the heart. Aneurisms of the aorta or other vessels in which coagulation may take place are special causes of this disease, the clots being washed along until they lodge in a cerebral vessel. Clots may originate in the lungs also. Men are more subject to this disease than women.

Pathology.—Post-mortem examinations show an artery occluded by a fibrinous clot; fibrinous clots are also usually found attached to the valves of the heart. Not only the fibrinous deposits from the valves of the heart but common blood-clots, probably washed out of a dilated artery, are found occluding the vessels. The middle cerebral artery of the left side is most frequently affected, the consequent paralysis being on the right side. The parts beyond the point of occlusion become anæmic, with a tendency to softening; the portions back of the point of occlusion are correspondingly congested.

Symptomatology.—There are no premonitory symptoms. The onset is sudden, and in a general way resembles an attack of cerebral hæmorrhage. The patient may feel perfectly well when he suddenly loses consciousness and falls down in a stupor. After a little time he recovers and finds paralysis of one side of the body. In other cases there may be simply confusion of mind, a sense of fainting, and accession of one-sided paralysis. The paralysis may affect the face or tongue only. Again, there may be no sense of confusion and no paralysis, but a sudden development of aphasia, strabismus, or ptosis. Sometimes there are hallucinations or illusions, but these are not commonly observed.

Diagnosis.—From cerebral hæmorrhage this condition is distinguished from the abruptness of the attack; the paralysis is right-sided, and is, in most cases, due to, or associated with, organic disease of the left side of the heart. The patient soon recovers from an attack of embolism; but in cerebral hæmorrhage recovery takes place only after several hours or days. No other disease resembles embolism to a degree to make the differential diagnosis at all difficult.

Prognosis.—The prognosis must always be guarded, for there is a constant tendency to softening of the brain-substance beyond the point of occlusion, and the organic heart disease which primarily caused the attack may lead to its repetition at almost any time. As to the immediate results following a given attack, no opinion can be advanced until the brain-symptoms have disappeared.

Treatment.—The treatment of embolism, like that of thrombosis, is unsatisfactory, the offending body being beyond reach. After an attack, attention should be given to the relief of the paralysis. For this purpose massage, friction, salt-baths, electricity, and manipulation and systematic exercise of the paralyzed muscles should be employed. The rheumatism and heart-trouble should receive attention with a view of preventing future trouble, if possible.

THROMBOSIS OF SINUSES.

Definition.—The formation of a thrombus in the veins or sinuses of the brain, setting up, sooner or later, an inflammation of these vessels.

Ætiology.—Disease of the heart or arteries, or anything that obstructs the return of blood from the head, may, by favoring the formation of clots, cause this disease. Strictures of the neck, or the growth of tumors along the jugular vein would form obstructions. The disease may result from causes within the head, such as inflammation of the brain substance or of the skull-bones, or the extension of disease from the ear. Inflammations following trephining, or extension of inflammation from erysipelas or carbuncles, may also cause this trouble.

Pathology.—The longitudinal sinus is ordinarily the seat of the disease: if due to the extension of inflammation from the ear, the lateral sinus is affected. At first the clots are black, but afterward they become grayish.

Symptomatology.—The diagnosis is difficult. Headache, epileptic convulsions, paralysis, particularly of the muscles of the eyes, diplopia, hyperæsthesia or anæsthesia, and finally coma, are the general signs of the disease. If these symptoms should follow the stoppage of otorrhœa, it would lead one to believe that thrombosis had occurred.

Diagnosis.—There are no reliable characteristic symptoms of this affection, and therefore a positive diagnosis cannot be made.

Prognosis.—Usually grave, as the disease is generally fatal.

Treatment.—Good diet and anything that will tend to keep up the patient's strength. Medical treatment is of no avail.

TUMORS OF THE BRAIN AND ITS MEMBRANES.

Definition.—They consist of pathological growths having their residence within the skull.

Ætiology.—Hereditary predisposition is an important factor in the production of intra-cranial tumors. Syphilitic gummata, tubercular and cancerous growths depend upon particular constitutional taints. Cancer is one of the most common primary forms, and is a disease of advanced life. Tubercular tumors are usually secondary and associated with tuberculosis of the lungs. They occur in youth, and are the most common of all cerebral tumors. Syphilitic tumors may develop at any time of life, and are most frequent in men. Injuries of the skull may excite the growth of tumors. Vascular tumors are simply aneurisms, and occur generally between the fortieth and sixtieth years of life. Cysticerci and echinococci are parasitic tumors.

Pathology.—A solitary tubercle consists of a hard nodule varying in size from that of a pea to that of a marble, of a grayish-yellow color and globular form. The inner portion is yellow and cheesy, the outer part reddish-gray. Cancer is frequently found in the dura mater and sometimes forces its way along the vessels and, perforating the bones, protrudes as a fungoid tumor. Simple cancer grows from the under surface of the pia mater. Syphilomata are found near the cerebral surface, and frequently are as large as a walnut or small lemon. Aneurismal tumors are chiefly at the base of the brain, and ordinarily terminate in rupture. Cysticerci are usually found in parts well supplied with vessels, the ventricles or pia mater being a common site. Echinococci often attain an enormous size, one growth being reported that weighed 18½ ounces. They reach the greatest size in the hemispheres and lateral ventricles, especially in children before the fontanelles have closed. Cysticerci are filled with fluid and have a tendency to destroy surrounding parts. Their presence keeps up a constant irritation which leads to inflammation and softening.

Symptomatology.—Headache is one of the earliest and most persistent symptoms. Vertigo, numbness, tingling and formication, trigeminal neuralgia, chorea, and a gradually progressive paralysis, commonly hemiplegic in character, gradually develop. If the tumor is at the base of the brain, diplopia is common and the hearing is affected. Vomiting is commonly associated with the headache and vertigo. The pulse is generally slow, but towards the end of the disease it becomes very frequent. Polyuria and saccharine urine are common, and point to irritation of the floor of the fourth ventricle. Subjects of tubercle and cancer usually show traces of cachexia in their make-up, but tumors of these classes may sometimes exist for quite a length of time before the general cachexia becomes manifest. Where vomiting persists the patient becomes reduced, and constant headache and sleeplessness tend to lower the vital powers. In such cases symptoms of insanity show themselves in the forms of emotional disturbance, as hysteria, hallucinations, delusions, and maniacal attacks. In other cases, apathy, drowsiness, and imbecility are developed.

Diagnosis.—In the early stages of disease due to intra-cranial tumors, it is almost impossible to make a positive diagnosis. The most characteristic sign is a double optic neuritis, to be seen on careful examination with the ophthalmoscope. In tubercular cases there is usually a well-defined affection of the lungs or abdominal organs, or an inherited phthisical tendency. Chronic hydrocephalus is frequently associated with tumors of this variety. Cerebral hæmorrhage occurs late in life, comes on suddenly, and is associated with disease of the heart or arteries and granular kidney. Tumors may occur at any time of life, and the symptoms caused by them are gradual in development.

Prognosis.—The prognosis is usually bad. Most cases, with the possible exception of those due to syphilis, result in death. Sometimes a patient may appear to improve for a time. The most prominent symptoms may disappear, and hopes of recovery may be entertained, but relapses are pretty certain to occur with a fatal termination.

Treatment.—For the tubercular variety the line of treatment has already been given under the head of tubercular meningitis. In cases due to syphilis, Mercury, Nitric acid, and Thuja should be employed. As regards other varieties, little can be done except to keep up the strength of the patient by the proper measures.

B. DISEASES OF THE SPINAL MARROW AND OF ITS COVERINGS.

BY CHARLES PORTER HART, M.D.

INTRODUCTORY.

As the spinal cord, instead of being a simple organ, is one of very complex structure and function, I deem it advisable to give in this introduction so much of its anatomy and physiology as may be required in the regional diagnosis of its diseases.

Structure.—The spinal cord is that part of the cerebro-spinal axis which is contained within the vertebral canal. It extends from the foramen magnum, at the base of the cranium, where it is continuous with the medulla oblongata, to the lower border of the first lumbar vertebra, where it terminates in a slender filament, the *filum terminale.* Like the brain, it is invested throughout its whole extent by two membranes, the *pia mater* and the *arachnoid.* Beneath the latter is the *sub-arachnoidean space*, containing a serous secretion, called the *cerebro-spinal fluid.* Outside the arachnoid membrane is a loose fibrous sheath, called the *dura mater* of the cord, which is continuous with that which invests the brain.

The spinal cord varies in length from fifteen to eighteen inches, according to the height of the individual; it also varies in diameter in different parts, there being both a cervical and a lumbar enlargement. The cervical enlargement, which extends from the third cervical to the first dorsal vertebra, is widest in a lateral direction; while the lumbar enlargement, which reaches from the lower part of the eleventh dorsal to the upper border of the first lumbar vertebra, is widest antero-posteriorly, thus giving it in every part the form of a flattened cylinder.

The cord, throughout its entire length, is almost completely divided into two equal and symmetrical halves by an *anterior median* and *posterior median fissure*. The posterior fissure is narrower and deeper than the anterior fissure, the former penetrating to about one-half, and the latter to about one-third of the thickness of the cord. This leaves an undivided portion near the centre, called the *commissure of the spinal cord*, in the centre of which is the spinal canal, extending downwards from the fourth ventricle, and about the one-eighth of a line in diameter.

Each lateral half of the cord is further divided into columns by three shallow fissures, or depressions, called respectively the *antero-lateral*, the *postero-lateral*, and the *postero-intermediary fissure*. The first two of these so-called fissures correspond to the superficial origin of the anterior and posterior roots of the spinal nerves. The postero-intermediary fissure is situated on the outer side of the postero-median fissure and, like the antero-lateral fissure, is scarcely perceptible, being most apparent in the cervical region. These fissures mark the boundaries of the *anterior*, *lateral*, *posterior*, and *postero-median columns* of the spinal cord. Some anatomists, however, include the first two columns in one, under the name of the *antero-lateral column*. These anatomical divisions of the cord have been so modified by pathological researches that, in order to designate with precision the situation and character of spinal lesions, it is now the rule to name certain regions of the cord after their respective functions, or after the investigators who first discovered them. Thus, the narrow spaces on either side of the anterior median fissure are called the *uncrossed pyramidal track* (Flechsig) or *columns of Türck*. Next to these, constituting the *fundamental parts of the anterior columns*, are the *anterior root-zones of Charcot*. Behind these, and extending back to the posterior horns of gray matter, are the two lateral columns of the cord, certain portions of which are named the *direct cerebellar columns* and the *crossed pyramidal columns*.

In like manner, the posterior columns have been divided into the *columns of Goll and* of *Burdach*, the former comprising the portions lying immediately on either side of the postero-median fissure, and the latter the *posterior root-zones of Charcot*.

The spinal cord gives off thirty-one pairs of nerves, each of which arises by two roots, one from the antero-lateral, and the other from the postero-lateral fissure. These two roots join each other and form one nerve before leaving the spinal canal. The posterior roots are larger than the anterior, while their filaments are finer and more delicate.

The cord is composed of gray and white matter, the former being disposed in the form of a double-crescent in the interior of the cord. Each half presents what is termed an *anterior* and *posterior cornu*, or *horn*, the cornua being directed towards the surface of the cord, and the convex surfaces joined by a band of gray matter, called the *gray commissure* of the cord. The anterior horn is short and thick, while the posterior horn is long and thin, and extends nearly to the point of attachment of the posterior roots of the spinal nerves.

The *gray matter* of the cord consists of (1) *nerve-cells of various forms and sizes*, with from *two to eight processes*;* (2) *nerve-fibres*; (3) *blood-vessels*; (4) *connective-tissue elements*. The cells of the anterior horn are *large* and *multipolar*, while those of the posterior cornu are *small* and mingled with what is termed the *gelatinous substance* of the cord. The nerve-fibres are *small*, and in the posterior horns are arranged in the form of *plexuses*.

The enlargement of the cord in the cervical and lumbar regions, where the nerves of the extremities are given off, is chiefly due to the increased amount of nerve-cells at those points, there being comparatively little gray matter in the intermediate portions of the cord.

The white substance of the cord is composed (1) of *nerve-fibres*, (2) *bloodvessels*, and (3) *connective-tissue elements*. The nerve-fibres, which differ in size, have a medullary sheath, but no investing membrane. They pursue two very distinct courses in the substance of the cord, one *transverse*, and the other *longitudinal*.

The fibres contained in the *anterior roots* are found, when traced back, to issue from the *anterior horns of gray matter*, and to be in immediate connection with the *prolongations of the cells* of that portion of the gray matter. These fibres traverse the cord horizontally or obliquely, and appear to be connected with the other set of roots on the same, or on the other, side of the cord.

The fibres composing the *posterior roots* may in like manner be traced to the *posterior horns of gray matter*. These fibres ascend and descend for a certain distance in the posterior columns of the cord, and then decussate. The decussation is effected either by the fibres themselves passing to the opposite side, or else, before leaving the gray matter, joining the prolongations of cells on the opposite side of the cord.

Some of the longitudinal fibres appear to connect the posterior roots directly with the posterior column, and others, after passing into the gray matter, emerge from it into the posterior column, or into the

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* Dr. L. Clarke, in Phil. Trans.

posterior part of the lateral column of the same or the opposite side. It is thought that most, if not all, of these longitudinal fibres are *commissures* connecting the nerve-roots of one segment with the nerve-cells of another segment above or below it, but how far they extend up or down the cord is unknown. They are more superficial than the transverse fibres, and constitute the greater portion of the white columns.

Function.—The chief functions of the spinal cord are: (1) the conveyance of sensory impressions of all kinds to the brain; (2) the transmission of motor influences from the brain to all parts of the body, especially to those supplied by voluntary muscles, and also to the bloodvessels, the several viscera, and their ducts; and (3) a vital or self-generating function, giving rise not only to the various kinds of reflex phenomena, but controlling the nutrition of the tissues and the functional activity of organs. Ordinary centripetal impressions enter the spinal cord by the posterior roots, cross to the opposite side of the cord by the decussating fibres, and reach the brain mainly through the posterior columns, though some of them, especially those from the lower extremities, are supposed to ascend by way of the lateral columns. *Painful* impressions, however, after passing through portions of the posterior columns, appear to traverse the gray matter of the cord, since injury of the latter is found to materially interfere with the transmission of such impressions.

Centrifugal or voluntary motor influences descend chiefly through the *crossed pyramidal tract* in the posterior part of the lateral columns, and after reaching the proper level in the cord, the motor fibres through which they travel penetrate the gray matter of the anterior horns, and are thus brought into relation with the great nerve-cells from which the fibres arise which constitute the anterior roots of the cord. What relation the *direct pyramidal tract* holds to the transmission of motor influences from the brain is not known, though it is believed to be in some manner related to the motor function of the cord.

Special Centres.—The gray matter of the cord embraces several special centres, the most important of which are the *cilio-spinal* and the *genito-urinary*. The cilio-spinal centre, according to the researches of Budge, Waller, and Brown-Séquard, is situated between the fifth cervical and second dorsal vertebra. Other observers make its boundaries still more extensive, Schiff carrying it as high as the medulla oblongata, and Claude Bernard as low as the seventh dorsal vertebra. This centre influences the vaso-motor nerves which supply the vessels of the eye and the side of the face and neck. The genito-urinary centre is situated in the dorso-lumbar portion of the cord. Irritation or injury of this centre gives rise to various degrees of irritability or paralysis of the genito-urinary organs. Various other vaso-motor

centres, which appear to be situated in the anterior ho
matter, exist all along the cord, but their special functions
most part very imperfectly known.

Reflex Action.—The reflex action of the spinal cord is one
important functions. This property resides in the cells
matter of the cord, sensory impressions being conveyed to
the posterior roots, and by them transmitted as motor i
the anterior or motor roots, without any participation of t

The chief reflex actions of the cord are termed *skin*
tendon reflexes. The principal skin reflexes are: (*a*) the *sc*
resulting from irritation of the skin in the interscapular
causing contraction of the scapular muscles; (*b*) the *epi*
from irritation of the chest over the fifth and sixth interc
causing contraction of the upper portion of the rectus
muscle; (*c*) the *abdominal reflex*, from irritation of the
between Poupart's ligament and the ribs, causing contra
abdominal muscles; (*d*) the *cremasteric reflex*, from irrita
skin on the upper and inner part of the thigh, with drawi
testicle; (*e*) the *gluteal reflex*, from irritation of the sk
nates, causing contraction of the gluteal muscles; and (*f*
reflex, from irritation of the sole of the foot, causing m
the toes, or of the toes and foot, or of these and the leg.

The chief tendon reflexes are: (*a*) the *ankle clonus*,
knee phenomenon, also called the *patellar reflex*, the *knee jer*
the *tendon reflex*. There is this marked difference betwe
forms of reflex action that whereas the *knee phenomenon* o
health, the *ankle clonus*, on the contrary, occurs only in
hence the latter is regarded by some as a more certain
spinal disease than is the absence of the former.

The patellar reflex may be excited by striking the t
patella a smart blow with the edge of the hand, whilst t
at an obtuse angle, or crossed loosely upon its fellow; th
ing a single upward jerk of the foot and leg. The an
produced by extending the knee and then pressing quick
continuously against the anterior portion of the sole of t
gives rise, in certain diseased conditions of the cord, to c
tions at the ankle joint, which continue while the pressu
but no longer. In some cases the whole limb, and eve
opposite side, is affected.

Lesions.—Diseases of the spinal cord are divided i
classes, (1) *systemic* or *systematic lesions*, and (2) *non-sys*
lesions. The former class includes those secondary
which tend to spread upward and downward, witho
laterally or to the adjacent columns. This class is su
(*a*) lesions of the *æsthesodic system*, and (*b*) lesions of

system, terms signifying respectively the *sensory* and *motor* tracts of the cord. Each embraces several distinct parts of the spinal cord, the former including the columns of Goll and of Burdach, or the entire antero-lateral columns and the anterior horns of gray matter, and the latter, or kinesodic system, embracing the lateral columns and the columns of Türck, or the posterior columns and the posterior horns of gray matter. The former includes those lesions the symptoms of which relate especially to sensation and coördination of movement, and the latter those which pertain chiefly to motor and trophic influences.

As most spinal lesions assume the form of distinct diseases, and as these will have to be fully discussed hereafter, we shall here touch only upon the most characteristic points pertaining to their diagnosis.

1. Sclerosis, when confined to the columns of Goll, cannot be diagnosed with certainty as to situation, but it may, and often does, occur there as a secondary result of other lesions which produce a progressive degenerative process in the spinal cord.

2. This lesion, which may affect the whole or only portions of the column, becomes more and more apparent as we ascend the cord, because the columns of Goll, which are wedge-shaped, are widest and most distinct in the cervical region.

3. Sclerosis of the columns of Burdach generally commences in the lumbar region, and gradually ascends towards the medulla oblongata, until, in some cases, the whole length of the column becomes affected. The same degenerative process takes place at the same time in the columns of Goll, but this condition is found to be a secondary result of the former.

4. Sclerosis of the posterior columns of the spinal cord can only be positively diagnosed when all the functions of those columns become impaired, namely, *sensation*, *coördination of movement*, and *reflex excitability*. It may, however, often be recognized, long before ataxic symptoms make their appearance, simply by the fulgurating pains alone, as these, if carefully scrutinized, may generally be distinguished from those of every other affection. If to these are added diminished reflex movements, and especially if the optic symptoms become more and more marked, as the disease extends upward along the cord, the nature and seat of the lesion may be considered as fully made out.

5. Sclerosis of the columns of Türck may occur either separately or in connection with similar degenerative changes in the postero-lateral columns of the cord. These changes, if secondary to encephalic lesions, will generally be preceded by crossed hemiplegia; but owing to degenerative changes in the columns of Türck, that is to say, in the direct or uncrossed pyramidal fibres of the cord, characteristic symptoms will usually manifest themselves on both sides of the body.

The diagnosis of anterior and postero-lateral sclerosis from progressive descending degeneration of the cord is rendered quite certain by the supervention of rigidity in the paralyzed muscles; and if this condition is accompanied by atrophy of the affected muscles, there is reason to suspect that the anterior horns of the gray matter of the cord have become implicated.

6. Sclerosis of the lateral columns of the cord may be distinguished from a similar condition of the posterior columns by the absence of anæsthesia, of numbness, and of fulgurating pains, even when the paretic state of the lower extremities is such as to simulate incoördination of movement. Moreover, in this condition there is a marked increase, instead of diminution, in the reflex excitability of the affected parts. If the lesion extend upward so as to involve the nerve-roots of the medulla, we may have developed, in addition to the other symptoms, the condition known as glosso-labio-laryngeal paralysis.

7. Degeneration of the ganglion cells of the anterior horns of the cord is easily distinguishable from atrophy of the same tissue, 1st, by the more rapid progress of the latter affection; 2d, by the absence of paralysis, coupled with progressive atrophy of individual muscles in the latter, and of suddenly recurring and extensive paralysis, followed by atrophy and contracture of the affected muscles, in the acute variety of the former. The chronic variety of myelitis is diagnosed with greater difficulty, but may generally be distinguished from progressive muscular atrophy or degeneration of the anterior nerve-cells by severe neuralgic pains and by the absence of fibrillary twitchings of the affected muscles. Central myelitis can only be diagnosed by a careful study and estimate of all the symptoms.

8. *Focal* or *transverse lesions* of the cord involve both the æsthesodic and the kinesodic systems, and hence generally produce *paralysis of motion*, *increase* or *diminution* of *reflex excitability*, more or less *anæsthesia*, *numbness*, and *pain*, and in some cases *trophic changes*, together with *paralysis of the lower sphincters*. There is but one systemic lesion of the cord capable of producing this combination of symptoms, and that is *central myelitis*.

9. There are five different regions of the cord the focal lesions of which produce symptoms sufficiently characteristic for diagnostic purposes, namely, the *upper cervical*, the *cervical enlargement*, the *mid-dorsal*, the *lower dorsal* or *supra-lumbar*, and the *lumbar enlargement*.

10. Focal lesions in the *upper cervical region* produce complete *hemiplegia* below the seat of lesion when *one lateral half* of the cord is involved, and complete *paraplegia*, with anæsthesia of the entire body, if the lesion involves the whole diameter of the cord. As the seat of lesion is such as to implicate the phrenic nerve, the diaphragm will be paralyzed, in consequence of which there will be more or less dyspnœa and hiccough; but unless the injury involve the respiratory

centre of the medulla—which is not the case when the lesion is confined simply to the upper cervical region of the cord—respiration will not be entirely arrested, since the function of the pneumogastric nerve will not be directly interfered with. It is only in slowly developed cases, however, that the lesion is thus limited, but when it is, we may have, in addition to the symptoms above mentioned, more or less disturbance of the pulse, from irritation of the acceleratory centre of the heart, and an increase of the temperature about the face and neck, together with irregularity of the pupils, from implication of the cilio-spinal centre in the lower cervical region, the paralysis in the meanwhile gradually increasing from above downward.

11. Focal lesions of the spinal cord seated within the *cervical enlargement* produce a gradual *descending paralysis* of the *arms and legs*, accompanied with a *sense of constriction* about the chest the precise situation of which depends upon that of the exciting cause. When the lesion is seated in the *upper part* of the enlargement, where the nerves composing the brachial plexus are given off, the paralysis will affect the parts to which its branches are distributed, namely, the muscles of the arm, the extensors of the forearm, and the parts supplied by the branches above the clavicle. The sense of constriction experienced in these cases is referred to the level of the clavicles; and when the lesion involves the whole diameter, the dyspnœa is extreme.

Lesions situated in the *lower portion* of the cervical enlargement affect the parts supplied by the ulnar nerve, causing not only a gradual paralysis, but in many cases ending in atrophy of the muscles supplied by that nerve, especially the flexor muscles of the wrist and the small muscles of the hand, particularly of the two inner fingers. The thoracic and abdominal muscles are also more or less affected, and if the lesion be an extensive one, may produce great and even dangerous embarrassment to respiration. The characteristic band-feeling, in this case, is experienced around the upper part of the chest. The extremities are more or less affected with paresis and anæsthesia, or it may be with paralysis, the effect corresponding with the extent of the lesion and the amount of injury done to the cord.

Lesions of the cervical enlargement may compress or destroy, or they may only irritate, the cilio-spinal centre, or they may have a similar effect upon the acceleratory centre of the heart. In the former case the pupils will generally be contracted, the face and neck red and congested, and the circulation retarded. In the latter the effects will be reversed; the pupils will usually be dilated, the face will be pale, and the action of the heart accelerated. When the lesion results from crushing of the vertebra, the temperature of the body may be considerably elevated, while the action of the heart may at the same time be more or less depressed.

12. Focal lesions of the *mid-dorsal region* produce a sense of con-

striction around the body in the region of the diaphragm. Sometimes, however, it may be felt as low down as the navel, and at other times as high as the axillæ, according as the lesion is in the middle or upper third of the dorsal portion of the cord. The muscles of the lower limbs at first become paretic, then paralyzed, and finally affected with contracture. In the early stages there usually exists a state of preternatural reflex excitability, which takes the form of muscular rigidity and stiffness whenever the patient endeavors to walk or stand. In other cases, or in the same cases at a later period, this reflex excitability assumes the form of tonic and clonic spasms. These convulsive movements, which may occur even when the patient is lying in bed, are often excited by exposure to even the slightest peripheral irritation, such as changing the position of the limbs, the presence of urine in the bladder, or the distension of the rectum by fæcal accumulations. Hence Brown-Séquard calls the condition *spinal-epilepsy*. Although the bladder and rectum may be paralyzed, the reflex excitability of the cord is so great that they frequently expel their contents voluntarily, as though they still retained their normal functions; but in the more advanced stages the urine is often retained, or only escapes by dribbling. The paralyzed muscles seldom degenerate or undergo atrophy, nor do they lose the power of electrical excitability.

13. Focal lesions in the *supra-lumbar* or *lower dorsal region* produce very nearly the same symptoms as those caused by lesions of the cord in the mid-dorsal region. The chief difference lies in the part of the body in which the sense of contraction is felt, which is lower down, being referred to a level between the umbilicus and the hips. The reflex spasms, though frequent and well-marked, are somewhat less violent than when the lesion is seated higher up the cord.

14. Focal lesions of the *lumbar enlargement* produce the most prominent effects when situated in the lower portion, that being the part of the cord which gives origin to the sciatic nerve. Hence we find that when this portion of the cord is affected the paralysis is chiefly manifested in the parts to which that nerve is distributed. The sphincter of the rectum is frequently paralyzed, but not that of the bladder. Sensibility is often impaired in the parts supplied by the sciatic nerve, there being usually a sense of numbness, and in some cases complete anæsthesia. The sense of constriction experienced in this class of spinal lesions is referred to the thigh or leg.

15. The symptoms above given apply to focal lesions affecting any portion of the transverse diameter of the cord. When limited to one lateral half of the cord, we have the phenomena known as spinal *hemiplegia* and spinal *hemi-paraplegia*. The former are the result of focal lesions confined to the one lateral half of that portion of the cord composing the cervical enlargement or the part above it; and the latter, of those limited to one lateral half of the dorsal region of

the cord. In both cases the paralysis is confined to the side of the body below the seat of the lesion, and the anæsthesia to the opposite side, also below the seat of lesion. Sometimes the phenomena are incomplete, owing to the incomplete destruction of the lateral half of the cord. When the lesion is so situated as to involve the cilio-spinal centre, the pupil is sluggish and does not respond to light, the face and neck are red and congested, and the temperature of the affected parts is above the normal standard. A rise in temperature in the paralyzed muscles also occurs from lesions seated in other portions of the cord, owing to the implication of vaso-motor centres in the regions severally affected. The seat of constriction varies in all cases with the part of the cord affected. The degree of reflex irritability in the paralyzed muscles indicates to what extent the gray matter of the cord is implicated, and the presence or absence of atrophy shows whether the trophic function of the cord has suffered by changes in the ganglion cells. The appearance of anæsthesia on the paralyzed side, or of paresis on the anæsthetic side of the body, shows not only that the lesion is progressing transversely, but that it has already passed the centre, and is beginning to invade the opposite half of the cord.

SPINAL HYPERÆMIA.

Synonyms.—Congestion of the spinal cord; French, Hypéremié de la Moëlle Épinière; German, Rückenmarks-hyperämie, Spinal-hyperämie.

Definition.—By spinal hyperæmia is meant a general or local excess of blood in the spinal cord and its membranes.

History.—Authorities differ widely as to the extent and frequency of this condition. Bastian,* while he does not question its existence and importance, says it is more frequently talked of than it deserves, and characterizes our knowledge of its symptoms as exceedingly "shadowy." Leudet, Hammond,† and others, on the contrary, regard it as an easily recognizable condition, and one which may and should be diagnosticated from all others.

Ætiology.—Spinal hyperæmia is frequently the result of such agencies as tend to drive the blood inward from the surface, such as exposure to intense cold, working in compressed air, and suffering from the cold stage of intermittent fever. Other causes are excessive muscular exertion, venereal excesses, the abuse of alcoholic stimulants, the suppression of customary discharges, long continuance in the erect position, and mechanical injuries, such as result from falls, blows, railway accidents, etc.

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* Dict. of Med., p. 1474.

† Diseases of Nervous System, seventh edition, page 395.

Morbid Anatomy and Pathology.—Section of the cord exhibits a hyperæmic condition of both the white and gray substance, the capillary vessels being increased both in size and number. The spinal membranes are also highly congested, the vessels being very large and tortuous, and capable from distension of exerting considerable pressure upon the cord. The cerebro-spinal fluid is generally found to be more or less increased in quantity.

These anatomical changes, it will be seen, are in perfect accord with the symptoms. The hyperæmia increases the excitability of the cord, while the pressure produced by it diminishes its functions in a corresponding degree. And since the former is due to congestion of the substance of the cord, and the latter to that of the membranes, the hyperæsthesia is readily accounted for by the hyperæmia of the gray substance, and the anæsthesia by the pressure of the congested membranes upon the white substance. The disturbances in the motor function may be explained in the same way, hyperæmia of the antero-lateral columns causing the twitchings in the muscles, while pressure upon them gives rise to paresis or paralysis. And since the recumbent position not only increases the congestion but also the pressure, we can readily understand why it is that all the symptoms are aggravated by it.

Symptoms.—The symptoms of spinal hyperæmia are limited to the seat of the lesion and to those parts of the body situated below it. The former is generally distinguished by a dull, aching pain, which is aggravated by any sudden jar or shock, and also, if the lower part of the cord be affected, by stooping or standing. It is also increased by the recumbent position, but not by pressure, provided the latter be steadily applied. Sometimes, though rarely, the patient experiences a sensation of heat in the affected portion of the cord, but it is never a very prominent symptom.

In addition to these local symptoms, there are others referable to the parts of the body below the seat of the lesion. Thus, if the upper portion of the cord be affected, there will be pains in the chest, together with more or less dyspnœa and palpitation of the heart; if the middle portion be involved, we may have pains in the chest or abdomen, or in both; if the lesion be in the lumbar or lower dorsal region, which is its most common seat, the lower extremities will be affected, giving rise to various disorders of sensibility and of mortality.

Some degree of anæsthesia is generally present, but it is seldom complete. It usually commences in the toes, which have a numb or swollen and prickling sensation in them, as if "asleep." In some cases there is hyperæsthesia, and this condition may coexist with anæsthesia. The degree and extent of these sensations may be best determined by the æsthesiometer.

For purposes of comparison we give below the minimum normal distances at which the two points of the instrument can be distinguished in different parts of the body:*

Extremity of the great toe,	5 lines.
Skin over the patella,	16 "
Skin over the sacrum,	18 "
Dorsum of the foot, near the toes,	18 "
The leg, near the knee and foot,	18 "
The middle of the thigh,	30 "

Shooting pains in, and a sense of constriction about, the lower limbs are occasionally experienced in these cases. The latter is known as the "band-feeling," and may be compared to the sensation caused by wearing a tight garter; it is not, however, a common symptom in simple spinal hyperæmia. Erections are frequent, especially at night, or after the patient has been long in the recumbent position. The temperature of the parts below the seat of lesion is always somewhat reduced.

But the most prominent symptoms, in most cases, are those relating to the power of motion. Paresis of the lower extremities always exists, and there may be more or less twitching of the muscles. The patient is generally able to move his limbs when sitting or lying down, though he may be unable to walk about, or even to stand alone. The lower sphincters are generally involved, especially the sphincter urinæ, in which case there is incontinence of urine and fæces. But more generally there is obstinate retention, owing to loss of expulsive power in the bladder and intestines, coupled with paralysis of the abdominal muscles. In this case the bladder never entirely frees itself; the urine becomes ammoniacal and fetid, and there is obstinate constipation.

The paralyzed muscles do not respond as promptly, nor as energetically, to the stimulus of the electric current as in health, but the loss of electro-muscular excitability in these cases is not generally very great.

The tendency of the disease is to spread until it involves the whole cord. This is especially the case in the active form of the complaint, and is increased in proportion to the dependent position of the cord, being greatest when the patient lies upon his back, as then the spinal bloodvessels are most easily congested.

Varieties.—Spinal hyperæmia may be either *active* or *passive*, the latter being the result of venous obstruction. The symptoms are nearly alike in each form, for although active spinal congestion produces exaltation of function, it likewise causes depression by pressure, the same as passive hyperæmia.

Diagnosis.—It is very important to distinguish this disease from spinal anæmia, as it requires exactly the opposite treatment. In spinal anæmia there is no anæsthesia, as in spinal hyperæmia; but hyperæsthesia, on the contrary, is much more common as well as more intense. When the posterior columns of the cord are affected, there is pain on pressure over the spinous processes of the vertebræ; and in anæmia of the antero-lateral columns the affection is frequently preceded by some disorder of the urinary organs, whereas in spinal hyperæmia the bladder-troubles come afterwards, being the result of the paraplegia. Moreover, in spinal hyperæmia the symptoms are always aggravated by the recumbent position, whereas in spinal anæmia they are always ameliorated.

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* Müller's Physiology, London, 1840.

Myelitis is distinguished from spinal hyperæmia by the much greater intensity of the symptoms; and spinal meningitis, not only by the severity of the symptoms, but by the pains produced by movements of the paralyzed limbs, and by the tonic contraction of the muscles, especially those of the back.

Prognosis.—The disease, if recent and uncomplicated, is usually amenable to treatment; but as the tendency is not only to implicate the whole cord, but to produce structural changes in it, the prognosis should be guarded, especially if the disease has already become chronic.

Prophylactic Treatment.—Although many cases of spinal hyperæmia recover speedily, especially such as arise from accidental injuries, it is highly important that the disease should be brought under treatment as early as possible, particularly if, from any cause, it is likely to recur, or to become general. Such persons, also, should be very careful to avoid any of the exciting causes of the disease, such as undue indulgence in alcoholic stimulants, venery, insufficient clothing, sudden changes of temperature, violent or injurious exertions of any kind, or exposure to any agency, such as cold, calculated to produce internal congestion.

Hygienic Treatment.—Moderate exercise in the open air, when practicable, is often far better than a strict observance of the dorsal decubitus, the long-continued maintenance of which, in either the active or passive form of the disease, is prejudicial. A nutritious but unstimulating diet should in all cases be prescribed.

Medical Treatment.—Special Indications.—Aconite.—Congestion of spinal cord, when attended with fever and numbness, or when caused by fevers, especially if attended by chilliness, anxiety, and restlessness.

Arnica.—Spinal congestion caused by over-exertion, strain, or mechanical injury; also when produced by the cold stage of intermittent fevers.

Belladonna.—Spinal hyperæmia attended with severe pains in the back, especially if accompanied by paralysis of the sphincter; pains relieved mostly by standing and walking about.

Cocculus.—Paralytic weakness of the lower extremities originating in the small of the back from exposure to cold; paralytic, aching pain in the lumbar region; drawing, aching pain in the back, as if it would break, sometimes accompanied with tremor.

Gelsemium.—Dull, aching pains in the upper part of the spine, worse in the morning or after lying down; paraplegia, accompanied with dull, aching pain in the spine, extending up to the occiput.

Natrum mur.—Paretic condition of the lower limbs, especially when caused by sexual excesses, or when accompanied by pain in the small of the back, as if broken.

Nux vomica.—Numbness and paralytic weakness of the lower extremities, with contusive and bruised pains in the small of the back, especially when aggravated by prolonged rest in a recumbent position, or when complicated with hæmorrhoids or constipation. This remedy should always be used high in this disease, otherwise it will do more harm than good.

Phosphorus.—Spinal congestion following sexual excesses; paralytic weakness of the small of the back, aggravated by lying; jerking and trembling of the muscles. This remedy, also, should never be used low in spinal congestion, otherwise it will be certain to aggravate the case.

Rhus tox.—Aching in the back and spine, with tingling, numbness, and paralytic weakness in the lower limbs, especially when caused by exposure to cold, excessive muscular exertions, straining, etc., aggravated by rest, and ameliorated by continued movement.

Secale corn.—Spinal hyperæmia, attended by paraplegia, involuntary discharges from the bowels and bladder; weariness and numbness in the lower extremities; trembling of the limbs, with formication in the feet; difficult urination. This is one of the very best remedies for spinal congestion, provided it is used low; the lower the better.

General Indications.—*For the local lesion.*—Aconite, Arnica, Belladonna, Bryonia, Laurocerasus, Nux vom., Phosphorus, Secale, Strychnia.

For paralysis of the bladder.—Arsenicum, Belladonna, Cantharides, Dulcamara, Lachesis, Lycopodium, Natrum mur.

For paralysis of the sphincter ani.—Causticum, Colocynthis, Hyoscyamus, Lycopodium, Phosphorus, Ruta.

For the paraplegia.—Cocculus, Laurocerasus, Nux vom., Phosphorus, Secale, Strychnia.

When caused by bodily exertion.—Arsenicum, Arnica, Rhus tox.

When caused by exposure to cold.—Arnica, Causticum, Colchicum, Dulcamara, Rhus tox.

When caused by sexual excesses.—China, Cocculus, Ferrum, Natrum mur., Nux vom., Secale, Strychnia.

Auxiliary Treatment.—The best local applications in this disease are the *hot-douche* and *electricity*. The former is most effective if the water, at a temperature of 100° F., be made to fall from a height of two or three feet upon the skin, over the affected cord, for a few minutes every day. The constant current of electricity should be passed through the affected part of the spine by sweeping one of the sponges over it daily, for ten minutes or so at a time, the strength of the current being as great as the patient can comfortably bear. The paralyzed muscles may be excited to contract, and their nutrition promoted, by subjecting them daily for half an hour or more to the action of the induced current. The primary current should not be employed oftener than once in two or three days.

SPINAL ANÆMIA.

Synonyms.—Anæmia of the spinal cord, Anæmia of the antero-lateral columns, Spinal paralysis, Reflex paraplegia, Inhibitory paralysis, Paralysis from peripheral irritation, Functional paralysis, Spinal exhaustion, Neurasthenia spinalis.

Definition.—Spinal anæmia is a disease characterized by such a general or local deficiency of blood in the vessels of the spinal cord as to impair its functions.

History.—Owing to the great difficulty, if not impossibility, of demonstrating anatomically the actual existence of this lesion, Vulpian* and many other pathologists exclude it from the category of special diseases. Others, like Bastian† and Mitchell,‡ give it only a qualified place amongst the causes of paraplegia. Hammond,§ on the contrary, not only includes under this head most of the diseases above mentioned, but also spinal irritation, which he refers exclusively to the posterior columns.

1. Anæmia of the Antero-Lateral Columns.

Ætiology.—Anæmia of the antero-lateral columns of the cord has been observed to follow exhausting attacks of various kinds, such as diarrhœa, dysentery, diphtheria, typhoid and typhus fevers, etc. Extreme cold, lying on the damp ground, and other like causes, may induce the disease, and many cases are on record where incomplete paraplegia has suddenly supervened on exposure to low degrees of temperature, especially when combined with dampness. The most common cause of the disorder, however, is peripheral irritation, especially such forms of it as involve the intestinal and genito-urinary organs.

Morbid Anatomy and Pathology.—No alterations of structure have been discovered after death in this form of spinal anæmia. But the absence of obvious lesions in these cases is not only perfectly consistent with the anæmic theory, but the symptoms seem to admit of no other rational explanation. Dr. Weir Mitchell attributes the phenomena of peripheral paralysis to exhaustion of the spinal centre from too constant or excessive exercise of normal function, or to spasm of the spinal vessels. These views of its pathology, which are the only plausible views hitherto advanced, are in perfect harmony with the anæmic theory of Dr. Hammond, and are further confirmed by the experiments of Küssmaul and Tenner, Vulpian, and other investigators, who, by cutting off the blood-supply, either by exciting vaso-motor spasm of the spinal vessels or by obstructing them by the introduction of foreign substances, promptly produced the characteristic phenomena.

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* "Leçons sur l'appareil vaso-moteur," 1875, t. ii.

† Dict. of Med., p. 1473.

‡ N. Y. Med. Jour., Feb., 1866.

§ Dis. of Nerv. Sys., seventh ed., pp. 399, 423.

Symptoms.—The chief symptom of this form of spinal lesion is motor paralysis of those parts which receive their nerve-supply from the affected portion of the cord, and sometimes from the parts below it. In most cases it takes the form of incomplete paraplegia, the patient being able to walk, though with considerable difficulty. Some of the muscles of the lower extremity are more frequently affected than others, especially the peronei and anterior tibial muscles.

Paralysis of the detrusor and sphincter urinæ may precede, but seldom result from, this form of spinal anæmia. Hammond states, however, that he has witnessed both paralysis of the bladder and of the sphincter coming on late in the disease, and evidently caused by it.

As a general rule, the affected muscles are not otherwise injured, there being neither spasmodic contractions (except occasionally slight fibrillary twitchings) nor loss of either electro-muscular or reflex excitability. Neither are there any disorders of sensibility present, unless the disease is complicated with anæmia of the posterior columns (*spinal irritation*), which, however, is a common occurrence. The same is true of disturbances of the stomach and bowels, which are seldom disordered. In short, the symptoms are chiefly confined to disorders of mobility, which generally take the form of muscular paresis.

Diagnosis.—Anæmia of the antero-lateral columns of the cord is distinguished from that of the posterior columns by the absence of any considerable disturbances of sensibility, and by the presence of well-marked, though incomplete, paraplegia. The disorder may be distinguished from spinal hyperæmia (1) by the fact that the disease is not progressive; (2) when the bladder is implicated it generally precedes the paralysis; and (3) the symptoms, instead of being aggravated by the recumbent position, are always mitigated by it.

Prognosis.—The prognosis is favorable whenever the cause is capable of being removed. When, on the other hand, the spinal arteries are obstructed by thrombosis or embolism, or the supply of blood is cut off, for instance, by abdominal tumors, softening of the cord soon sets in, and the prognosis is necessarily bad.

2. NEURASTHENIA SPINALIS.

It is with some hesitancy that I place this disease under this head, partly because it is seldom, if ever, an independent affection of the cord, and partly because I am not certain that it depends altogether, or even to any great extent, upon spinal anæmia, since, like spinal irritation and the various forms of reflex paraplegia, it does not appear to be associated with any demonstrable pathological changes. Still, it is probably nothing more than a particular form of the disease last described, and I shall therefore briefly notice it in the same connection.

Ætiology.—Everything calculated to weaken the system or exhaust the nervous energy may act as an exciting cause of the disease. Hence, in addition to cerebral exhaustion, produced by excessive mental labor, worry, grief, and other forms of mental irritation or depression, all forms of dissipation, late hours, overwork, and severe exhausting diseases, are capable of producing it. This will probably account for the fact that the disease is chiefly confined to the male sex.

Symptoms.—The disease manifests itself chiefly by a rapid exhaustion of motive power, especially in the lower extremities, the patient becoming rapidly weak, and unable to walk or stand, after any little exertion of that kind. There is also more or less pain in the back and lower limbs, of a transitory, shifting character, which may generally be brought on by any little exertion, or by slight exposure to cold. A marked peculiarity of this symptom is, that it is always associated with fatigue; that is, fatigue always produces it. Sleeplessness and loss of virile power are prominent symptoms in this disease, as well as in the cerebral form of the affection. The patient is seldom able to obtain more than one short sleep, and that usually occurs in the early part of the night. As for the genital function, the semen escapes too quickly, sometimes without an erection, and is followed by great prostration. Cases farther advanced are attended with neuralgic pains in the back and legs, creeping chills along the spine, great nervousness and prostration, palpitation, general anæmia, profuse night-sweats, and a copious discharge of phosphates in the urine. At the same time, there is generally an absence of any marked disturbance in the natural sensibility or motility of the extremities, or of any symptoms indicating any thing more than functional weakness of the nervous centres.

Diagnosis.—The disease is not very liable to be confounded with any other form of nervous disorder, unless it be cerebral exhaustion, the symptoms of which are nearly the same. The chief difference is that in the latter the cerebral symptoms predominate, and in the former, the spinal. Thus, in cerebral exhaustion the intellectual and moral faculties are weak, the emotions easily excited, and the mental equilibrium greatly disturbed or lost. The patient also suffers from headache, bad temper, and excitability. In spinal exhaustion, on the other hand, the inability to walk without fatigue, the backache, and the genito-urinary symptoms, are the most prominent features of the case, the cerebral symptoms, if any, being chiefly secondary. In many cases, however, the distinction is more theoretical than practical, the disease involving both of the great nervous centres to such a degree as to constitute it a cerebro-spinal affection. In these cases the *cause* will often serve as a valuable diagnostic mark, cerebral neurasthenia being generally due to excessive mental labor, worry, or some other form of mental action, while neurasthenia spinalis is commonly induced by severe physical exertions, excessive sexual indulgence, onanism, etc.

Prophylactic Treatment.—The only satisfactory treatment of spinal anæmia, preventive as well as curative, must have reference to the exciting causes of the disease, and as these differ widely in different cases, it is evident that susceptible individuals should either avoid such causes altogether, or else, if unavoidably exposed to them, guard as far as possible against their effects. Hence, such forms of peripheral irritation as dentition, worms, diarrhœa, dysentery, pleurisy, pneumonia, genito-urinary irritation, etc., should always receive prompt and appropriate treatment, while all such practices as are calculated to lower the tone of the system, such as too close confinement to business, mental and physical strain, venereal excesses, allopathic drugging, etc., if indulged in, should be at once abandoned. On the other hand, if the system is feeble, or the blood impoverished, in addition to suitable hygienic measures, such medicines as *Arsenicum*, *China*, *Ferrum*, *Phosphoric acid*, etc., will, by strengthening the general system, prove decidedly prophylactic.

Hygienic Treatment.—The diet should, as a rule, be of the most nutritious and supporting character. When there are no complications to contra-indicate their use, such articles as beef, eggs, milk, and the like, should be prescribed. Active or passive exercise in the open air, whenever practicable, should also be enjoined. The clothing should not only always be of a seasonable character, but pains should be taken to protect in this way the surface of the body against the deleterious effects of cold and dampness.

Therapeutics.—**Alumina.**—Paralytic symptoms induced by cold, especially when associated with pain in the back, want of animal heat, great heaviness in the lower extremities, feeling of weakness in the genito-urinary organs, constipation, great exhaustion of strength after slight exertion, and unrefreshing sleep.

Arsenicum.—Paretic condition of the lower limbs, especially when associated with an anæmic condition of the general system; sensation of weakness in the small of the back; trembling of the limbs from debility; paralytic weakness induced by watery alvine discharges; constant disposition to lie down; restlessness, especially at night.

Calcarea carb.—Paralysis produced or aggravated by sexual excesses; great exhaustion, especially in the morning; feeling of great weakness in the lower extremities, especially in the knees, and extending to the back; bruised feeling in the back and thighs, especially after a short walk; great weariness and heaviness of the lower limbs, even after resting.

China.—Paralysis arising from general anæmia or from loss of animal fluids; debility following severe and exhausting illness; great weariness, with aversion to exercise or any form of mental or physical employment; trembling of the lower limbs, with nervousness.

Kali phos.—Spinal anæmia from exhausting diseases, such as diphtheria, reflex paraplegia, with laming pains, aggravated by rest, but most manifest on beginning to move about.

Lycopodium.—Great nervous prostration; paralysis associated with formication, flatulency, and constipation.

Natrum phos.—Paralytic weakness of the lower extremities, with general prostration; heaviness and sensation of fatigue, especially after a short walk, or ascending steps; legs give way, so as to be unable to progress farther.

Nux vomica.—Spinal anæmia, reflex paralysis, or paralysis from nervous exhaustion; great debility of the nervous system, with partial paralysis, numbness and coldness of the lower extremities; pain as from a bruise in the small of the back and knees; tottering gait, from heaviness and weariness of the lower limbs; paralysis of the bladder; general torpor, especially of the liver, stomach, and bowels.

Phosphorus.—Spinal paralysis from anæmia of the cord; great heaviness and weariness after the least exertion; bruised feeling in the back and limbs; extreme mental and physical prostration.

Rhus tox.—Paralysis arising from spinal anæmia, especially when caused by exposure to cold and dampness, venereal excesses, or any form of typhoid disease; heaviness and weariness of the lower limbs, with slow dragging, difficult walk; sore, bruised, aching feeling in the back and limbs, with constant disposition to rest, though the latter gives no relief, but rather aggravates the suffering.

Strychnia.—Anæmia of the spinal cord, with paralysis, from exhaustion of the reflex motor power of the spinal nerve-cells. As Strychnia and Phosphorus are the two best remedies for this condition, they may be given in alternation, succession, or combination; the latter in the form of the *Phosphate of Strychnia*, which is an admirable remedy in these cases.

General Indications.—*When the paralysis is due to dental irritation.*—Aconite, Belladonna, Chamomilla, Cicuta, Cuprum, Hyoscyamus, Ignatia, Nux vomica, Stannum, Stramonium.

When caused by worms.—Cicuta, China, Ignatia, Santonine, Terebinthina.

When caused by diarrhœa.—Arsenicum, Calcarea, China, Ferrum, Ipecacuanha, Phosphorus, Phosphoric acid, Secale cornut., Veratrum.

When caused by dysentery.—Arsenicum, Baptisea, China, Ferrum phosphor., Nitric acid, Phosphorus, Rhus tox., Sulphur.

When due to genito-urinary irritation.—Apis, Belladonna, Cantharides, Dulcamara, Hyoscyamus, Lycopodium, Cactus, Gelsemium, Equisetum.

When due to diphtheria.—Gelsemium, Nux vom., Rhus tox., Phosphorus, Tartar emet., Arsenicum, China, Ferrum.

When caused by cold, or cold and dampness combined.—Gelsemium, Dulcamara, Rhus tox., Veratrum, Apis, Belladonna.

When caused by external injury.—Arnica, Cicuta, Conium, Phosphorus, Rhus tox., Ruta, Sulphur.

When caused by pleurisy and pneumonia.—Bryonia, Phosphorus, Tartar emet., Sulphur.

When caused by sexual excesses.—Agnus castus, Aurum, Calcarea carb., China, Dioscorea, Helonias, Nitric acid, Nux vom., Phosphorus, Phosphoric acid, Picric acid, Sarsaparilla, Sepia, Zincum.

When caused by exhausting diseases.—Arsenicum, Calcarca carb., Carbo veg., China, Kali phos., Nux vom., Phosphorus, Phosphoric acid, Picric acid, Zincum phos.

Auxiliary Treatment.—The *direct or constant* galvanic current will be found highly beneficial in most cases, one pole being placed at either extremity of the spinal column, and the other swept up and down the spine for two or three minutes at a time, each daily *séance* lasting some fifteen or twenty minutes. The nutrition of the paralyzed muscles may be secured by *massage* or by the *secondary or faradic* current of electricity.

SPINAL IRRITATION.

Synonyms.—Anæmia of the posterior columns of the spinal cord, Neuralgia of the spine, Rachialgia; French, Rachialgie; German, Rückgratschmerz.

Definition.—Spinal irritation is a condition characterized by a greater or less degree of spinal tenderness, and by a morbid excitability of the nerves proceeding from the affected portion of the cord.

History.—Though the term *spinal irritation* was applied to this disease as early as the year 1828,* and Dr. Frank Lad previously described it under the name of *rachialgia*,† most of its manifestations have, at different times, been regarded as merely hysterical. Even now the disorder is far from being generally viewed as a distinct disease, many authors of distinction referring its most essential symptoms to neuralgia,‡ myalgia,§ or hysteria.‖ Notwithstanding this, however, the majority of late writers on the subject, including Brown-Séquard,¶ prefer the term "spinal irritation," although some English and American writers, adopting the views of Hammond,** call the disease "posterior spinal anæmia."

Ætiology.—Spinal irritation is almost exclusively confined to women, and occurs chiefly between the ages of fifteen and twenty-five. So great is the influence of sex, that out of more than three hundred and fifty cases there were only forty-five males. This disproportion arises, no doubt, from the debilitating effect of uterine disorders, since the disease appears to be due in all cases to weakening agencies, such as the loss of vital fluids, sexual excesses, and exhausting diseases. Hence it is found to be generally associated with uterine and other hæmorrhages, leucorrhœa, over-lactation, spermatorrhœa, onanism, diphtheria, dysentery, typhoid and other fevers, or some cause capable of producing an anæmic or debilitated state of the system.

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* Dr. Brown, in Glasgow Med. Jour., No. ii.

† Prax. Med. univ., p. ii., t. i.

‡ Stiebel, in Rust's Mag., t. i., c. xvi.

§ Skey on Myalgia, 2d edition, page 225, *et seq.*

‖ Traité des Neuralgies, etc., Paris, 1841, page 345.

¶ Quain's Dict. of Med., page 1499, *et seq.*

** Dis. of Nerv. Sys., 7th edition, page 400, *et seq.*

Morbid Anatomy and Pathology.—No pathological changes have yet been discovered in these cases, either in the spinal cord or its membranes, unless it be a slight degree of congestion. It does not follow, however, that no such changes ever exist, since opportunities rarely occur for making post-mortem examinations in this disease. The symptoms, as well as the ætiology of spinal irritation, seem to point to some form of spinal anæmia as the probable cause of the disorder, at least in most cases—a condition the existence of which is almost impossible of demonstration. This, however, is the theory of Hammond* and his followers, who regard the disease as being essentially an anæmia of the posterior columns of the cord. The principal arguments advanced in support of this theory are: (1) that the general condition of the patient is always below par, a condition which the exciting causes of the disease tend to produce; (2) that the symptoms point, in almost every case, to the posterior columns as the special seat of the disease; and (3) that whatever improves the quality of the blood, or increases the amount of it in the spinal vessels, always benefits the patient, while, on the other hand, those agents which are known to lessen the quantity of blood in the vessels of the cord always aggravate the disease. This explanation, however, will only apply to those cases in which the nerves of sensibility are alone affected; where those of the motor sphere are implicated, the antero-lateral columns must also be involved. It is not unlikely that in some cases the two opposite conditions of hyperæmia and anæmia may coexist in different portions of the cord, as maintained by Hamilton and others; and it may be that, agreeably to the views of Ollivier and others, it is sometimes due to hyperæmia alone, as the symptoms occasionally correspond more nearly to that condition than to any other. It thus appears that the pathology of spinal irritation is still unsettled; nevertheless, the majority of pathologists incline to the anæmic theory, for the reasons above given.

Symptoms.—The characteristic symptoms of spinal irritation are spinal tenderness with or without spontaneous spinal pains, various functional disorders of the viscera, and motor and vaso-motor disturbances. Spinal tenderness is the most important symptom, as it is the only constant and essential one. This symptom, however, may be so slight as not to attract the patient's attention, and hence the necessity of making a careful vaginal examination in all suspicious cases. By making firm pressure on the spinous and transverse processes of the vertebræ we may discover either a general tenderness, extending over the whole or a large portion of the vertebral column, or, which is more common, the tenderness may be limited to one or two, or at most to only a few, of the vertebræ. Considerable pressure is sometimes required to develop it; whilst, on the other hand, the sensitiveness to pressure may be so great as to cause the patient to wince at the slightest touch. Indeed, cases are sometimes met with in which nausea, vomiting, fainting, and even convulsions are produced by only a very light degree of external pressure. The lower portion of the dorsal and cervical regions are the parts most frequently affected, especially the former; and many cases are met with in which there is no pain or uneasiness in any other portion of the spine. Sometimes the tenderness is unilateral, and then the greatest pain is experienced when pressure is made over the transverse processes of the vertebræ, instead of over the spinous processes. Cutaneous hyperæsthesia is not uncommon, and this may be so great as to cause the patient to shrink at the lightest touch of the finger. As a rule, however, no pain is experienced except when pressure is made over the affected vertebræ; but sometimes an intense aching is felt at the seat of lesion, and occasionally pains shoot from it in different directions, anteriorly, laterally, or downward into the extremities. The spontaneous pains generally have their seat at the points of exit of the spinal nerves from the spine, thus greatly resembling the neuralgic pains. Spontaneous spinal pains often greatly differ, however, in character, sensations of heaviness, cold, heat, tingling, prickling, and itching being among the more common. These symptoms, according to Dr. Hammond, are observed in about one case out of three of spinal irritation. Brown-Séquard thinks their frequency is much greater than this. They are, however, of far less importance, in a diagnostic point of view, than the spinal tenderness, partly because they are less constant, but chiefly because they frequently exist in organic diseases of the spine.

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* Op. cit., page 414.

The symptoms of spinal irritation necessarily vary with the region of the spine affected. Thus, when the *cervical region* is involved we have headache, vertigo, insomnia, mental disturbances, incubus, neuralgic pains in the head, face, neck, and upper part of the body, convulsive and fibrillary movements in the upper extremities, tonic contraction of the flexor muscles of the forearms, and various throat and chest symptoms, such as disturbances in phonation and deglutition, spasmodic cough, dyspnœa, syncope, and palpitation of the heart. When seated in the *dorsal region*, the irritation gives rise more particularly to a variety of gastric symptoms, such as pain in and around the stomach, eructations, nausea, vomiting, pyrosis, etc. Cough, dyspnœa, and other chest symptoms are sometimes met with, but, with the exception of cardiac disturbances, are far less common than when the cervical region is involved. The same is true of spasmodic and neuralgic symptoms. *Lumbar rachialgia* is very rare, but when present is represented by the following symptoms: pain in the lumbar and abdominal regions, painful spasms of the lower sphincters, neuralgia of the uterus, ovaries, and lower limbs, contraction of the flexor muscles of the lower extremities, chronic or clonic spasmodic movements, pseudo-paralysis, etc. When the disease affects every part of the spine (*general rachialgia*), the symptoms above enumerated are present together, showing themselves to a greater or less extent in every part of the body. The pains caused by pressure on one spinous process will, in these cases, generally extend over the whole spine. Hyperæsthesia is also usually found to be much greater than when the irritation is localized. The symptoms vary greatly, not only in different cases, but in the same case at different times; remissions and exacerbations are also common.

Varieties.—Although, as already stated, spinal irritation gives rise to an almost unlimited variety of morbid phenomena, it usually presents itself under one of the following forms, or varieties, namely: (1) where spinal tenderness is the only obvious feature of the disease; (2) where, in addition to the tenderness, there are marked disturbances of sensibility; and (3) where the motor sphere is likewise prominently involved.

Diagnosis.—As spinal irritation is always characterized by more or less spinal tenderness, it is liable to be mistaken by superficial observers for other diseases having a like symptom, especially spinal meningitis and chronic myelitis. From the former it may be distinguished by the far less acute character of the symptoms—especially the hyperæsthesia and pains on motion—as well as by the history of the case. Chronic myelitis is characterized by anæsthesia, painful muscular contractions, and paralysis—symptoms which do not belong to spinal irritation. In spinal congestion, also, there is more or less anæsthesia, numbness, and formication, instead of hyperæsthesia; and when a sponge, dipped in water, is passed over the spine, an intense aching is produced, which is not the case in spinal irritation. As for caries of the spine, although there is spinal tenderness increased by pressure, the other symptoms, such as the age, the angular curvature, and the scrofulous condition of the patient, clearly establish its existence, and not that of spinal irritation. On the other hand, hysteria is very liable to be mistaken for spinal irritation; and it should not be forgotten that these two diseases frequently co-exist in the same patient.

Prognosis.—I cannot agree with those who regard this disease as one of trifling importance; for although the prognosis is generally good, provided the patient will steadily coöperate with the physician, not only so far as abstaining from every pernicious and debilitating practice is concerned, but by a constant adherence to the prescribed treatment and regimen, yet, owing either to the changeable disposition of the patient or the peculiar obstinacy of the disease, a large proportion of cases are never cured, and the patient's life is rendered miserable by the weakness, the pains, and the many functional disorders it entails.

Treatment.—On this subject the writer feels that he cannot do better than to repeat what he has elsewhere said,* namely: "the treatment, both internal and general, should be especially directed towards the improvement of the patient's general health, the condition of which is in most cases both the predisposing and the efficient cause of the whole trouble. This calls for the removal, not only of such exciting causes as leucorrhœa, over-nursing, hæmorrhage, diarrhœa, spermatorrhœa, or other drain on the system, but a toning up of it by means of good nourishing diet, pure, fresh, country air, out-door exercise, change of scene, bathing, swimming, coasting, sleighing, romping; in short, a complete change of habit, and of those hygienic conditions which originated and, if permitted to continue, will promote the disease. We cannot be too emphatic on this subject; indeed, we have no hesitation in saying, that unless the patient's habits and surroundings can be completely changed, the mode of life revolutionized, and the weakened machinery got out of the ruts in which it has fixed itself, all other treatment, however appropriate, will be liable to fail. At the same time, nothing should be said calculated to discourage the patient. On the contrary, many cases will require the best hygienic mental as well as physical treatment, cheering up the patient being of the utmost importance."

Special Indications.—**Cimicifuga.**—Amenorrhœa; palpitation on the least movement of the patient; extreme tenderness over the spinous processes of the vertebræ, especially in the lumbar region, with constant nausea and retching on pressure; frequent fainting fits; more particularly indicated in cases arising from uterine disorders, especially where there is much pain in the dorso-lumbar region and head, with weakness of the lower extremities; worse at the menstrual period and on taking cold.

Belladonna.—Constant burning pain in the spine, with extreme sensitiveness to pressure over the dorsal vertebræ; pressure in the mid-dorsal region causes frontal headache, flushed face, violent, dry cough, nausea, and perspiration.

Cocculus.—Sensitiveness to pressure in the upper part of the spine, accompanied with violent palpitations, oppression of the chest, trembling of the limbs, and stiffness of the neck; or cephalalgia, with sleeplessness and hyperæsthesia of all the special senses; great mental and physical susceptibility.

Hypericum.—Spinal irritation complicated with mania; tenderness of the whole spine; laming-aching in the small of the back; stitches in the dorsal region; paroxysms of pain in different parts of the body.

Natrum mur.—Pain in the back, with sensitiveness of the spine; eyes sore on pressure; vision clouded with black spots; hemiopia; supra-orbital neuralgia, with nausea and sensitiveness to bright lights; anorexia; constipation; sleeplessness; morning headache; restlessness and debility.

Rhus tox.—Extreme sensitiveness of the spine to pressure, with violent pain in the head and down the back; lies on her back, with the head and back drawn backward; anxious, oppressed breathing, with violent palpitations, occurring in paroxysms.

Secale corn.—Tenderness over the superior spinous processes, with stiffness of the neck; pains radiate from the affected portion of the spine all through the chest; anxious, oppressed breathing, with palpitations, and tendency to convulsive movements in the semi-paralyzed limbs. This remedy will aggravate unless used very high.

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* Diseases of the Nervous System, page 307.

Strych. phos.—Aching and weakness in the spine, with tenderness on pressure in the mid-dorsal region; burning-aching in the spine, extending to the front of the chest and causing a feeling of uneasiness and nausea; sleeplessness; cold feet; feet, hands, and axillæ covered with clammy perspiration.

Tarentula.—This remedy is indicated in spinal irritation when complicated with anæmia of the antero-lateral tracts of the cord, as manifested by spasmodic pains, muscular contractions, clonic convulsive movements, tremblings, general chilliness, etc.; also when there are spasmodic pains in the chest, intense headache, cardiac disturbances, and sensation of burning all over the body.

The following remedies have proved beneficial in particular cases: *Agaricus*, *Atropia*, *Aconite*, *Calcarea carb.* and *iodat.*, *Calcis hypophos.*, *Chamomilla*, *China*, *Colocynthis*, *Gelsemium*, *Naja*, *Nux vom.*, *Phosphorus*, *Santonine*, *Scutellaria*, *Silicea*, *Sulphur*, *Tellurium*, *Veratrum vir.*, *Zincum phos.* and *met.*

Auxiliary Treatment.—One of the most efficient means of cure is *absolute rest.* This statement may seem inconsistent with the previous one in relation to exercise, but the fact is, unless the rest is rendered *absolute*, it is sure to do more harm than good. It will not do for the patient to lie quiet one hour and move about, or even turn in bed, the next, but there must be constant and absolute rest of the affected part for several weeks, or until it is ascertained that both pain and tenderness have entirely disappeared from the spine. In the mean time, the muscles of the limbs should be gently galvanized several times a day, not only for the purpose of maintaining their nutrition, but also to favor the general circulation of the blood. This treatment is indorsed by such names as Hilton, Mitchell,* and Brown-Séquard†; and I can also bear personal testimony to its efficiency when rigidly and perseveringly carried out.

Almost every form of local application has been tried with more or less success in different cases, including the various forms of counter-irritation, rubefacient and stimulating liniments, hot and cold douches, and the various forms of electricity. I prefer the constant galvanic current to the spine, placing one of the poles over the tender vertebræ, and the other at some near point. The applications should be made once or twice a day, each sitting lasting from ten to fifteen minutes, according to the severity of the case. The peripheral disturbances are best treated by the interrupted current, especially when the applications can be made directly to the sensitive surfaces. Even where this is impracticable, very great relief may often be afforded by sending the current *through* the sensitive part, by placing the positive pole on the tender vertebræ, and the negative on the opposite side of the body. In cases complicated with hysteria I have seen the best results from passing the current through the uterus, the negative pole being applied directly to the organ by means of a vaginal insulator, or indirectly by a broad conductor applied to the hypogastrium.

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* Am. Clin. Lec., vol. i., No. 4.

† Quain's Dict. of Med., page 1502.

SPINAL HÆMORRHAGE.

Synonyms.—Hæmorrhage into the spinal cord or its membranes, Spinal apoplexy; Hæmotorrhagia medullæ spinalis, Hæmatomyelia; (Fr.) Apoplexie de la moelle épinière, Hématomyélie, Hémorrhagie intrarachidienne; (Ger.) Rückenmarksapoplexie.

Definition.—The term "spinal hæmorrhage" is used to denote, not only hæmorrhage into the substance of the cord, but also spinal *meningeal* hæmorrhage, the great majority of cases usually classed under this head being of that variety.

Ætiology.—The principal causes of spinal hæmorrhage are myelitis, softening, and traumatic injuries, such as result from severe blows, falls, roadway and railway accidents, gun-shot wounds, etc. Many other causes have been assigned, such as tetanus, low fevers, amenorrhœa, violent lifting and straining, excessive sexual indulgence, the too free use of alcoholic liquors, prolonged exposure to severe cold, etc., but it is not certain that they exert any causative influence on the disease.

Morbid Anatomy and Pathology.—When the blood is effused into the substance of the cord, it is generally confined to the gray matter. It extends both longitudinally and laterally, but chiefly in the direction of the long axis of the cord, the clot varying in size from that of a hazelnut, or less, to that of an almond, and in some cases it occupies the entire centre of the cord for several inches. These effusions occur most frequently in the cervical region, becoming less and less frequent as we descend the cord. The white substance seldom yields to the pressure, but when it does, or when lacerated by injury, a blood-tumor generally appears under the meninges.

The symptoms of spinal hæmorrhage are clearly the result of irritation and compression of the nervous tissues of the cord. When the effusion takes place gradually, the first effect is generally one of excitation, giving rise to spasms and hyperæsthesia; but when it occurs suddenly, or in any considerable quantity, the pressure becomes so great as to destroy or greatly impair the function of the cord, producing at once a greater or less degree of paralysis and anæsthesia.

Symptoms.—The characteristic symptoms of spinal hæmorrhage are pain at the seat of lesion, and sensory and motor disturbances in the parts to which the nerves derived from that portion of the cord and the portions below it are distributed. As a general rule, the functions of this part of the cord are either immediately abolished or greatly impaired, producing paralysis and anæsthesia in the parts below; but occasionally there are spasms and hyperæsthesia. When the hæmorrhage takes place gradually, it first produces numbness in the extremities, pain and stiffness at the seat of lesion, or in the cervical region, headache, and great weakness of the extremities, and sometimes of the whole body. When fully developed, the lower sphincters are paralyzed as well as the extremities, and so also is the detrusor urinæ. Reflex and electric excitability are likewise lost or greatly impaired.

Acute bed-sores are apt to form in these cases, similar to those caused by cerebral hæmorrhage. This form of decubitus is not owing to pressure, but to paralysis of the trophic centre in the gray substance of the cord, and generally betokens a fatal result. It is usually accompanied by an increase of bodily temperature, the mercury sometimes rising to 101° or 102° F.

Diagnosis.—When the effusion takes place slowly, and is so situated as to implicate, not only the lower extremities, but important parts above, such as the muscles of respiration, the diagnosis may generally be made out, at least to the extent of establishing an intravertebral hæmorrhage; but it is evident that in most cases the chief reliance must be upon the history of the case, the existing symptoms affording but few diagnostic marks. When, however, paraplegia takes place suddenly, and is plainly the result of an accident, we shall generally be warranted in attributing the paralysis to medullary or meningeal effusion, particularly the latter.

Prognosis.—The prognosis is extremely unfavorable, as the great majority of cases prove fatal sooner or later. A considerable number of cases of paraplegia, however, apparently resulting from spinal hæmorrhage, are on record, which have recovered, and although there may have been an error of diagnosis in some of them it is plain that cases of spinal hæmorrhage should not be regarded as utterly hopeless. The seat, no less than the extent, of the lesion greatly influences the prognosis, since effusions in the cervical region are far more dangerous to life than those which occur in the dorsal and lumbar regions, because they are liable to implicate the phrenic nerves, and may thus produce sudden death by asphyxia.

If the blood be effused rapidly, death will generally ensue within a few hours or days; but if slowly, life may be prolonged indefinitely, but, in most cases, only at the expense of a greater or less degree of paralysis and anæsthesia in the parts below.

Treatment.—In traumatic cases, the leading indications are to arrest and prevent hæmorrhage and inflammation within the spinal canal; and this can be best accomplished by keeping the patient as quiet as possible, applying ice to the spine, and administering such remedies as *Aconite*, *Belladonna*, *Hamamelis*, *Secale corn.*, etc.

When the hæmorrhage sets in gradually, an opportunity is afforded for making that nice distinction in the selection of remedies which is necessary for the satisfactory management of these difficult cases. Aside, however, from the administration of the class of remedies best adapted to promote the absorption of the clot, such as *Arnica*, *Guaco*, *Kali iod.*, *Sulphur*, etc., little more can be done than to select from the following list (the *special indications* for which may be found under the head of *paraplegia*) such remedies as are best calculated to remove or lessen the exciting cause and its effects, viz.: *Anacardium*, *Baryta carb.*, *Belladonna*, *Causticum*, *Cocculus*, *Cuprum*, *Gelsemium*, *Lachesis*, *Laurocerasus*, *Natrum mur.*, *Nux vom.*, *Oxalic acid*, Phosphorus, *Plumbum*, *Secale cor.*, *Stramonium*.

TETANUS.

Synonyms.—Lockjaw, Central myelitis; (Fr.) Tétanos; (Ger.) Starrkrampf.

Definition.—Tetanus is a disease characterized by a rigid contraction of voluntary muscles, alternating with a greater or less degree of relaxation, caused by an excited state of the medulla oblongata and spinal cord.

When the tonic spasm involves only the muscles of deglutition, it constitutes *trismus* or *lockjaw;* when it implicates the dorsal muscles, so as to bend the body backwards, we have what is called *opisthotonos;* when other sets of muscles are affected, we have *orthotonos*, *emprosthotonos*, or *pleurothotonos*, according as the body remains straight, or is bent forwards or to either side, conditions which are rarely met with in practice.

Ætiology.—Most cases of tetanus are of traumatic origin. Although sometimes caused by injuries which do not produce a breach of surface, the great majority of cases are due to a wound of some kind, and it is a singular fact that the wound is often apparently very trivial; thus I have known it to arise from the mere prick of a pin. In such cases, the injury generally implicates some portion of the peripheral nervous system. Thus, in a case of tetanus arising from a small wound just above the external malleolus, I found the external saphenous nerve lacerated. In infants the disorder is sometimes due to the separation of the umbilical cord (*trismus nascentium*). In short, it is the character and situation, rather than the magnitude, of the wound which apparently most influences its production; contused, punctured, and lacerated wounds, such as are caused by gunshot, burns, rusty nails, etc., being far more apt to give rise to it than clean cuts and thrusts, however extensive. Experience shows, also, that wounds of the hands and feet, or where tendons and nerves are most exposed to injury, are more liable to be followed by tetanus than are those of other parts.

While wounds are undeniably the most frequent cause of tetanus, it is equally certain that local circumstances and great meteorological changes exert a marked influence in its production. Exposure to cold and damp not only favors its occurrence among the wounded, but is capable of exciting it in others, giving rise to what is called the *rheumatic* form, in contradistinction to the traumatic. Sleeping on the cold, damp ground, or living in low, damp situations, are the usual antecedents of this form, which, though generally slight and limited to a feeling of stiffness about the neck and jaws, is, when fully developed, as severe and dangerous to life as the other forms of the disease. This is especially the case in tropical countries, where it is most prevalent, and where a cold bath, or even the drinking of very cold water, when in a state of perspiration, will sometimes produce it.

Various internal injuries, especially such as result from lesions of the rectum, uterus, pleura, and lungs, are among the exciting causes of tetanus; and so also are the poisonous effects of such agents as strychnia, brucia, mephitic gases, etc., which give rise to what is called, by way of distinction, *toxic* tetanus. It is worthy of remark, however, that the symptoms of this form, though closely resembling, do not perfectly correspond with those of true tetanus, there being less permanency of the muscular rigidity and a predominance of convulsive action.

Age and sex appear to influence its production, the greatest mortality being in the male sex, and between the ages of five and forty-five years. It is also of frequent occurrence among new-born infants, especially in hot climates. With this exception, it is comparatively rare in children under five years of age; it is also rare in advanced life. As regards sex, no less than eighty per cent. of all cases are males. This is probably owing to the circumstance that men are much more exposed to accidental injury than women.

Morbid Anatomy and Pathology.—Various lesions of the cord have been discovered after death from tetanus, but it is not certain whether these changes are the causes, or simply the effects, of the tetanic manifestations. It is true that Dr. Clarke* discovered undoubted lesions in the six cases examined by him, the most important of which consisted in an enlargement of the bloodvessels of the cord, especially in the posterior horns of gray matter, together with granular disintegration of the nerve-tissue. These results were subsequently confirmed by post-mortem examinations made by Drs. Dickinson,† Albutt,‡ Fox,§ and others. On the other hand, many cases occur in which no pathological changes are found to exist, at least nothing which can be regarded as furnishing any decisive evidence that the spinal cord is the actual seat of the disease. Moreover, although there is much in the symptomatology of the disease to support the ordinary theory of reflex action of the cord, as well as to show that the violent contraction of the muscles is due to irritation of the peripheral nerves at the seat of lesion, yet, on the other hand, there are circumstances which indicate that the spinal cord is not the primary centre of reflex action in these cases, but that the morbid influence, whatever it may be, which excites the disease, is reflected first upon the medulla oblongata, and afterwards extends to the spinal cord.

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* Medico-Chirurg. Trans., vol. xlviii., p. 255.

† Ibid., vol. li., p. 267.

‡ Trans. Path. Soc. of Lond., vol. xxii., p. 27.

§ Archiv. de Phys., 1871, p. 59.

Symptoms.—In whatever way induced, tetanus almost always commences with a feeling of stiffness in the neck or about the jaws. No matter what may be the situation of the wound, if such exist, the spasm first affects the muscles supplied by the motor branch of the seventh nerve. Difficulty of swallowing also sets in early, showing that the muscles of the pharynx are likewise affected. Thus far the symptoms, though characteristic, are not severe, as the patient is still able to open his mouth; but in a few hours other sets of muscles become implicated, and those about the jaws, as the masseter and temporal, become permanently rigid from tonic spasm, constituting the condition known as *trismus* or *lockjaw*. The muscles of expression are now involved to such an extent as to give to the countenance a terror-stricken appearance (*risus sardonicus*).

When the disease reaches its height, there are general tonic and clonic spasms of all the voluntary muscles of the body. These are of the most violent and painful character. The muscles and limbs often become as hard and as stiff as so many boards. At times, however, the tonic rigidity partially gives way, and the spasms assume the clonic form. The convulsive movements are often very violent, jerking and twisting the patient in every direction.

The tetanic paroxysms alternate with periods of comparative relaxation, though the rigidity of one or more muscular groups is constant throughout the entire course of the disease. During the paroxysm the patient's body is sometimes bent like a bow, the whole weight of the trunk resting on the back of the head and heels (*opisthotonos*). The rigidity affects the thoracic and abdominal muscles, rendering the latter hard and tense, and the breathing extremely difficult and irregular.

At first slight, and happening only at distant intervals, the paroxysms gradually become more and more frequent and violent, until at last they occur every few minutes, especially if the case is about to terminate fatally.

The spasms are usually extremely painful, though it is said they are not always so; but, as a rule, they are attended by fearful suffering. The latter is not confined to pain and dyspnœa, but the patient is tormented with hunger and thirst which he is unable to alleviate, and especially with loss of sleep, caused by the ever-recurring spasms.

When sleep *does* occur, the spasms cease. Constipation and retention of urine are also troublesome symptoms, arising from spasm of the lower sphincters. The skin is usually bathed in perspiration, which is always very profuse after violent paroxysms.

Notwithstanding the absence of fever, which never exists except when the disease is complicated with inflammation, the pulse is gradually accelerated, rising to 90, 120, and, in fatal cases, even to 180 per minute. It rises also during every convulsive seizure, but becomes less frequent again when the paroxysm is over.

The temperature also varies greatly, increasing at each successive paroxysm until it reaches a height of from 100° to 105° F., and, in fatal cases, from 107° to 112° F., the latter temperature being registered after death, and due, it is supposed, to the rapid coagulation of myocene in the muscular tissue.

The intellectual faculties generally remain clear to the last.

Diagnosis.—Some cases of hysteria bear a slight resemblance to tetanus, and might possibly be mistaken for it by a superficial observer. The characteristic symptoms, however, no less than the history and duration of the two diseases, are amply sufficient to distinguish them from each other.

On the other hand, toxic tetanus, especially that form of it which is caused by strychnia, is much more difficult of diagnosis; and, as strychnia is frequently used for purposes of murder and suicide, it is highly important to be able to discriminate between the natural and the artificial disease. In the former the spasm always first takes the form of trismus, while in the latter the lower extremities are first affected; the hands also are generally involved in these cases, whereas, in the natural disease, the upper extremities generally escape altogether. Moreover, the duration of the natural disease is generally much greater than that produced by strychnia, which usually proves fatal within half an hour, or so, of its commencement.

Prognosis.—Very few cases of acute tetanus recover; the majority die within a week, and a considerable proportion within the first twenty-four hours. Where the symptoms continue beyond two weeks without resulting fatally, the chances of ultimate recovery are favorable; and the same is true if they do not set in until after ten days from the receipt of the injury. Cases attended with frequent convulsive seizures are almost uniformly fatal, the patient either dying suddenly from asphyxia, or else sinking into a hopeless state of exhaustion. When recovery takes place, it is always gradual and more or less protracted. Paralysis of the muscles supplied by the portio-dura, and also of certain muscles of the extremities, is likely to remain after recovery, the former being due to ascending neuritis, and the latter, probably, to similar lesions in the cord.

Treatment.—Special Indications.—Belladonna.—Stiffness of the jaws, with convulsive movements, dilated pupils, difficult deglutition, lancinating pains, staring eyes, spasmodic respiration, restlessness, involuntary discharges, insomnia, cerebral and spinal hyperæmia.

Cicuta.—Trismus, with spasms of the œsophagus, paleness of the face, rigidity of the affected muscles, whitish ulcers on the borders of the tongue; eyes fixed, opisthotonos, and foaming at the mouth; spasms excited by the slightest touch or movement.

Conium.—Spasm of the jaws, with difficult deglutition; heat in the face, with congestion of blood in the head and spine; violent pain in the chest, with difficult breathing; great exhaustion, with trembling of the whole body; protruded eyes and dilated pupils; tight, oppressed feeling at the pit of the stomach when leaning backwards, with arrest of breathing and suppression of speech.

Gelsemium.—Stiffness of the jaws; pain and stiffness in the back of the neck; spasmodic sensation in the pharynx and œsophagus, with difficulty of swallowing; constrictive pain about the chest, with difficulty of breathing; dilatation of the pupils; cramps in the legs; involuntary discharges of fæces and urine; convulsive action of the voluntary muscles.

This remedy having proven efficient in my hands in a well-marked case of traumatic tetanus, I deem it advisable, in this connection, to lay it again* before the profession: B. S., æt. 13, run the stub of a dried weed into his left leg just above the ankle, lacerating the external saphenous vein and nerve. The wound was treated by the parents with bacon; it suppurated freely, and finally healed, with the exception of a small fistulous opening which, owing to the objections to the use of the knife, was treated by injections of Iodine. On the third day of this treatment—the ninth after the accident—stiffness of the jaws and neck set in, with difficulty of swallowing, moderate fever, some headache, a coated tongue, and darting pains in the wounded leg. Prescribed an emollient poultice to the sore, and gave *Belladonna* 3d dil., every hour. Next day worse; jaws tightly locked; abdominal muscles rigid; head bent backward and deeply buried in the pillow; pupils dilated; eyes staring; pulse hard, 96; breathing irregular and hissing; extensor muscles of the limbs contracted, hard, and rigid; fistulous opening puffed and tender; wounded limb jerks and twitches whenever it is touched. Laid open the fistula, with a curved bistoury, to the extent of three inches in the course of the affected nerve and vein, and reapplied the poultice. Prescribed *Gelsemium*, gtt. xv. to half a glass of water, a teaspoonful every hour. Next day much better; pulse 75, soft; no opisthotonos or trismus, but some soreness about the neck and jaws. Continued the treatment during the next three days, but at more distant intervals. Patient made a good recovery, and in two weeks attended school.

Lachesis.—Opisthotonos, trismus, rigors, shooting pains in the back, throat sensitive to contact, and swallowing almost impossible; tetanic look, with half-closed eyes and stiffness of the neck. Two cases said to have been cured by this remedy.

Physostigma.—Paralysis, preceded by twitching or trembling of the muscles; dilatation of the pupils; syncope or tendency to fainting; trembling convulsive action of the respiratory muscles; alternate dilatation and contraction of the pupils, the former corresponding with the period of spasm, and the latter with the period of quiescence. This is a favorite remedy with the old school, and is said to have cured many cases.

Phytolacca.—Opisthotonos, with general muscular rigidity; teeth tightly clinched; extremities stiff; fingers and toes firmly flexed; respiration difficult; pupils contracted; muscles of the face and neck alternately contracted and relaxed.

Stramonium.—Trismus; opisthotonos; apoplectic condition, with snoring, red face, and deep sleep; body hot; urine copious; grinding of the teeth; contortion of the hands; shuddering; constriction and spasm of the œsophagus; constriction of the chest, with difficult breathing.

Consult also the following remedies: *Ammonium carb.*, *Amyl nitrite*, *Angustura*, *Arnica*, *Arsenicum*, *Camphora*, *Cannabis*, *Cuprum*, *Curare*, *Hydrocyanic acid*, *Hyoscyamus*, *Ignatia*, *Laurocerasus*, *Lycopodium*,

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* See Dis. of the Nerv. Sys., p. 114.

Moschus, Nicotinum, Nux vom., Opium, Platina, Rhux tox., Secale cor., Strychnia, Veratrum viride.

Auxiliary Treatment.—The auxiliary measures which have, at one time or another, been recommended in this disease, include almost every kind of stimulating and sedative applications, division of the neighboring nerve, pressure, counter-irritation, the hot bath, cold effusion, ice-bags or hot-water bags to the spine, and protracted sweating. Most of these measures have, of late, been entirely abandoned as being worse than useless; but ice placed along the spine is said to have given relief in some cases, besides having the advantage of being a rational and easily applied remedy.

PARAPLEGIA.

Synonyms.—Spinal paralysis or palsy, Paraplexia; (Fr.) Paraplégie, Paralysie spinale; (Ger.) Paralysis spinalis, Spinalparalysie.

Definition.—Paralysis of the lower extremities, with or without paralysis of the lower part of the trunk, bladder, and rectum.

Ætiology.—Paraplegia is usually caused by pressure upon, or disorganization or degeneration of, some portion of the spinal cord, in consequence of disease involving either the cord, its membranes, or the vertebræ. The most frequent causes are myelitis, or inflammation, and sclerosis, or hyperplastic degeneration, of the substance of the cord, the chief symptom of which is paralysis of motion corresponding to the precise seat and extent of the spinal lesion. Among other causes are certain toxic agents, which, when taken into the body, are capable of producing a paraplegia, such as alcohol, aconitia, chloral, conia, ergot, prussic acid, veratria, arsenic, lead, and many animal poisons. There is good reason, also, to believe that marshmiasm, or the malaria which gives rise to intermittent fever, may produce it in some cases. Peripheric and eccentric irritations are likewise capable of exciting the disease; at least, various forms of so-called reflex or functional paraplegia are supposed to be caused in this manner.

Morbid Anatomy and Pathology.—The anatomical changes which characterize the various forms of spinal paralysis will be given under proper headings in succeeding articles. Toxic and reflex paraplegias exhibit no pathological alterations, being simply due to vaso-motor spasm arising from disease or injury of remote organs, without any appreciable evidences of organic disease in the cord or its membranes.

Symptoms.—The symptoms vary considerably, according as the disease is organic or functional. In both forms, however, the paralysis is generally bilateral, but sometimes it is unilateral, constituting what is called *hemiparaplegia.* When of spinal origin, it may be either sudden or gradual in its development, and may affect the lower extremities alone, or embrace the trunk-muscles also, as high up as the nerve-supply is implicated. The upper extremities, as well as the bladder and rectum, frequently escape, but this depends upon the seat of the lesion. In most cases the lower sphincters are involved to a greater or less extent. The general sensibility may remain unimpaired, though sometimes it is more or less defective in the paralyzed parts. On the other hand, hyperæsthesia and increased reflex excitability are more frequent than complete anæsthesia, even when there is total paralysis of motion. These symptoms, however, vary according to the pathological changes present in the cord, on which they depend (see *Myelitis*, *Spinal Meningitis*, and the various forms of *Spinal Paralysis*, *Spinal Sclerosis*, etc.). On the other hand, in the case of reflex, or functional, paraplegia, the symptoms will be likely to vary, both in character and in degree, according to the particular form and intensity of the peripheral irritation or influence which gives rise to them.

Diagnosis.—The diagnosis of the various forms of centric or organic paraplegia will be found in succeeding articles treating thereon, and need not be repeated here. Reflex paraplegia may be known partly by the absence of the distinctive symptoms of organic disease of the cord, and partly by the rapid improvement which usually attends the removal of the specific influence, or source of irritation, which causes the paralysis, such as worms, carious teeth, urinary troubles, etc.

Prognosis.—The prognosis is good if the cause is capable of being removed, and the right treatment is adopted. This is especially true of reflex, hysterical, and other forms of functional paraplegia; and even toxic and organic forms will sometimes yield to well-directed and persevering treatment, as may be seen by reference to the succeeding articles treating of these subjects.

Treatment.—If reflex, hysterical, intermittent, or toxic, treat the condition on which the paralysis depends, or, in other words, *remove the cause;* and if organic, or spinal, observe the treatment laid down under the particular disease of which the paraplegia is a symptom.

MYELITIS.

Synonyms.—Inflammation of the spinal cord, Softening of the spinal cord, Myelitis acuta; (Fr.) Myélite, Inflam. de la moëlle épinière, Ramollissement de la moëlle épinière; (Ger.) Rückenmarksentzündung, Erweichung des Rückenmarks.

Definition.—*Myelitis* and *myelitis acuta* are terms now used synonymously to denote an acute inflammation of the whole or of any portion of the spinal cord.

Ætiology.—The principal causes of myelitis are violent mechanical injuries, such as fracture and dislocation of the vertebræ, concussion of the spine and cord by falls and blows, gunshot wounds, etc. It is also occasionally due to long exposure to cold and damp, to over-exertion, especially when combined with cold, and, in short, to all those causes capable of exciting leptomeningitis spinalis.

For reasons stated under the head of pathology, the writer would restrict the term "myelitis" to *inflammatory softenings* of the cord. The ætiology of some of these softenings is at present very imperfectly understood. Most of them, however, occur as secondary changes, resulting (1) from traumatic injuries of the cord; (2) from compression of the cord by tumors, blood-clots, etc.; (3) from the extension of meningeal inflammation (*leptomeningitis*) to the substance of the cord; and (4) from vascular obstruction caused by micrococci or by minute thromboses in the gray substance of the cord.

Morbid Anatomy and Pathology.—Until within a comparatively recent period, every form of spinal softening was regarded as inflammatory. Such, however, is no longer the case, one form after another having been eliminated from the category of inflammatory softenings as above classified. It is true, some writers still adhere to the old notions concerning softening of the cord, regarding as inflammatory not only the so-called *acute central myelitis*,* with the allied affection, *myelitis diffusa*—forms which may, or may not, be of an inflammatory nature—but also the large class of primary softenings due chiefly to vascular disturbances, and which properly belong to the degenerative type of nervous diseases. Not only so, but even "secondary" degenerations of the cord are looked upon by some as inflammatory,† simply because, it would appear, the nerve-tissues are softened by a primary fatty degeneration, although subsequently secondary hyperplasia of the neuroglia sets in, giving rise to sclerosis. But since there is no satisfactory evidence of an inflammatory origin of these cases, but, on the contrary, the most conclusive proofs, both clinical and pathological, of their belonging to the non-inflammatory type of degenerative changes, we shall class them with the latter, along with chronic and other forms of so-called myelitis having similar characteristics.

Symptoms.—The inflammation, which is at first partial, and generally situated in the lower portion of the cord, gives rise to scattered areas of softening, which in some cases remain limited in site, and in others advance from below upward, constituting *myelitis ascendens*, or, as occasionally happens, spread from above downward, constituting *myelitis descendens*. When the inflammatory process becomes general, the febrile excitement runs very high, and the pain in the back and other symptoms correspond in intensity. They are not, however, as a rule, so intense in character as when produced by acute spinal meningitis, though they may be, and probably are, increased when myelitis is combined with that disease.

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* Archiv. de Phys., 1874, p. 603.

† Ziemssen's Cyclopædia, vol. xiii., p. 769.

The characteristic symptom of myelitis, however, is paralysis of motion. This symptom, which corresponds to the precise seat and extent of the lesion, may come on gradually, or the paralysis may set in rapidly and become complete within a few hours. In the former case it is generally preceded by stiffness and heaviness in the extremities, a sensation of "pins and needles," as though the limbs were asleep, and a feeling of pressure in the bladder and rectum, as though they needed emptying. Or there may be great restlessness of the limbs, followed by twitching and jerking, both of the limbs and of individual muscles. A sensation of tightness or constriction is sometimes experienced, not only about the limbs, but about the body, as though encircled by a tight bandage. This symptom, which varies according to the seat of the lesion, is generally felt about the waist or neck. When the periphery of the cord is involved, it is apt to produce an acute dragging pain, especially at night; but great tenderness or hyperæsthesia is not experienced unless meningitis is associated with the myelitis.

The paralysis is first noticed in the feet or hands, and is incomplete. As the paresis increases, more or less rigidity may occur from meningeal complications, in which case the patient will be unable to walk or properly exercise his limbs, even before the stage of complete paraplegia has been reached.

The paralysis will be general or partial, according as the inflammation involves the whole or only a part of the cord; it may be more on one side than on the other, and of different degrees, from slight paretic debility up to perfect paraplegia.

Local gangrene, in the form of bedsores and sloughs, makes its appearance at a very early period in the disease, and although it occurs on the parts subject to pressure, as the hips, nates, and sacrum, it is evidently not owing to pressure or to want of cleanliness, but to paralysis of the trophic centre in the cord.

Reflex excitability and electro-muscular contractility are diminished in proportion to the extent of the disease. The temperature of the paralyzed parts is also correspondingly reduced, falling in some cases as much as two or three degrees below the normal standard.

Diagnosis.—The characteristic symptoms of the disease, such as the "band-feeling" about the body and the rapid development of paraplegia, together with the reflex phenomena of pain and convulsive movements, are generally sufficient to distinguish myelitis from other affections of the spine, even without regard to the history of the case, which in traumatic injuries is often sufficient of itself to determine the diagnosis.

Prognosis.—If the prognosis, in the various forms of injury which give rise to myelitis, is of a grave and more or less doubtful character, the gravity of the lesion cannot fail to be enhanced by any degree of inflammatory action associated therewith. Whatever form, therefore, the central disease may assume, the prognosis is always more or less doubtful. In mild and favorable cases the inflammation may possibly be subdued, but even then, in many cases, the ultimate result, so far as the paralysis is concerned, is well-nigh hopeless.

Treatment.—Special Indications.—Aconite.—Early stage, attended with high fever, painful anæsthesia, numbness of back and extremities, formications, spasms, and icy coldness of the hands and feet. The remedy should in most cases be pushed to the extent of producing a profuse perspiration, which, happily, is usually easily induced.

Angustura vera.—Bruised pain in the small of the back, or in the muscles of the neck; tremulous stitches in the thighs, especially when sitting; twitching and jerking along the back like electric shocks; tension of the facial muscles; lockjaw.

Apis mel.—Bruised feeling in the dorsal and lumbar regions; violent pains in the sacrum; paralysis, with contractions of the flexor muscles and emaciation of the limbs.

Arnica.—Traumatic cases, especially after the more acute symptoms have subsided. As a general rule, the more chronic the paralysis, the more satisfactory the action of the remedy, provided softening or degeneration of the nerve-fibres has not set in.

Arsenicum.—Constriction of the chest, with great dyspnœa and anxiety; twitching, trembling, violent starting, and weariness in all the limbs; tetanic spasms

Belladonna.—Pains in the back, with weakness and weariness; tonic and clonic spasms; partial or general paralysis; dyspnœa; paralysis of the ocular muscles and iris.

Gelsemium.—Early stage of myelitis, especially when involving the antero-lateral columns of the cord; cerebro-spinal symptoms; confusion of the head, extending from occiput to forehead; paresis of tongue and glottis; spinal exhaustion; incontinence of urine; loss of voluntary motion.

Causticum.—Trembling of the extremities when walking or standing, but not when sitting; paralysis implicating the urinary organs; lancinating pains in the back arresting the breathing; numbness and insensibility of the fingers and toes, with a feeling of icy coldness and a tending to cramp.

Mercurius.—Violent pains in the spine, worse from motion; paralysis and anæsthesia of the lower extremities; occasional jerking in the paralyzed muscles; paralysis of the bladder and rectum; great restlessness and sleeplessness, especially at night.

Phosphorus.—Myelitis and paraplegia resulting from sexual excesses; also when complicated with spondylitis; numbness and insensibility of the extremities; especially indicated where there is an hereditary tuberculous condition of the system, or where the suppurative exudation is sanious and offensive.

Secale cor.—Paralysis and anæsthesia of the limbs; violent pain in the back, especially in the sacral region; muscular twitching and jerking in the limbs; tingling in the back, extending to the fingers and toes; painful contraction of the flexor muscles; spasm of the tongue; paralysis of the bladder and rectum; especially indicated in cases complicated with spinal meningitis.

Veratrum alb.—Aching and stitching pains in the back; painful paralytic weakness in both the upper and lower extremities; tingling in the hands as though they were asleep; violent cramping pains in the flexor muscles and calves of the legs; icy coldness of the hands and feet; painful jerking in the limbs.

General Indications.—*Simple or uncomplicated cases.*—Aconite, Belladonna, Causticum, China, Cocculus, Conium, Cuprum, Gelsemium, Mercurius, Rhus.

Complicated with softening.—Belladonna, Hepar sulph., Kali mur., Mercurius, Phosphorus, Silicea.

Myelitis ascendens.—Conium, Ledum.

Myelitis descendens.—Atropine, Belladonna, Gelsemium, Mercurius, Nux vom., Phosphorus, Rhus tox., Secale.

Myelitis bulbaris.—Baryta, Belladonna, Cocculus, Cuprum, Causticum, Mercurius, Plumbum, Secale, Stramonium.

Myelitis dorsalis.—Aconite, Gelsemium, Causticum, Cocculus, Nux vom., Rhus tox., Phosphorus, Plumbum, Sulphur.

Myelitis cervicalis.—Aconite, Atropine, Belladonna, Gelsemium, Angustura vera, Arsenicum, Cuprum, Fluoric acid, Oxalic acid, Physostigma, Secale.

Traumatic cases.—Arnica, Conium, Hypericum, Phosphorus, Ruta, Silicea, Sulphur.

When caused by concussion.—Arnica, Bryonia, Cicuta, Conium, Rhus tox., Lachesis, Sulphur.

When caused by cold.—Belladonna, Calcarea, Causticum, Dulcamara, Hepar sulph., Lycopodium, Phosphorus, Rhus toxicod., Sepia, Sulphur.

When caused by cold water.—Antimonium, Belladonna, Calcarea, Carbo veg., Dulcamara, Mercurius, Pulsatilla, Rhus toxicod., Sepia, Silicea.

When caused by sexual excesses.—Calcarea, China, Gelsemium, Natrum mur., Nux vom., Phosphorus, Phosphoric acid, Sulphur.

When caused by over-exertion.—Arnica, Bryonia, China, Cocculus, Rhus, Silicea, Veratrum.

When caused by mental emotion.—Aconite, Belladonna, Bryonia, Calcarea, Causticum, Chamomilla, Coffea, Hyoscyamus, Ignatia, Lachesis, Nux vom., Phosphorus, Pulsatilla, Veratrum.

Hygienic Treatment.—Absolute rest should be secured, and, if possible, in the prone position. The bowels should be relieved by enemata; bed-sores should be prevented, if possible, and the general health should receive the most assiduous attention. The patient should be supported by the most nutritious and easily digestible forms of spoon-diet, and, if necessary, a small amount of stimulants should be allowed.

Auxiliary Treatment.—The actual cautery is said to have been effective in mild cases. The best external remedy, however, is cold, in the form of ice-bags, placed along the spine. After the inflammation is subdued, the remaining paralysis may be benefited by the methodical application of faradization or galvanism to the affected limbs. In such cases, also, the spray douche on the spinal column may be frequently employed with advantage, as recommended by Kafka.

MYELOMALACIA.

Synonyms.—Softening of the spinal cord; Simple, white, or non-inflammatory softening; Mollities medullæ spinalis; French, Ramollissement de la Moëlle Épinière; German, Erweichung des Rückenmarks.

Definition.—By *myelomalacia* we now understand a primary, non-inflammatory, and apparently idiopathic softening of the spinal cord.

History and Ætiology.—This disease was formerly regarded as chronic myelitis; or rather, it was supposed to be due to simple inflammation of the cord, either acute or chronic. Similar cerebral and cerebellar conditions, however, are well known to depend upon embolism or thromboses of intra-cranial bloodvessels, and hence, although the efficient cause is not as demonstrable in these cases as in those of the brain and cerebellum, analogy would lead us to refer primary spinal softening to a similar origin. That no obstruction of the spinal bloodvessels has yet been shown to exist in these cases, may be due (1) to the comparatively small size of the vessels of the cord; (2) to the very free anastomoses of the spinal arteries, whereby the effect of obstruction would necessarily be greatly obscured; and (3) to the fact, pointed out by Ollivier, that the obstruction is probably mostly limited to the spinal veins, in consequence of the numerous causes which tend to retard the blood-current in those vessels.

Other causes of myelomalacia doubtless exist, but they are not positively known. Dr. Hammond thinks he has in several instances traced the origin of the disease to excessive sexual indulgence; and I have met with one case, in a scrofulous subject, in which the only apparent cause was over-exertion. Other antecedents of the disease sometimes met with are: prolonged exposure to cold and damp; violent emotional disturbances; acute exanthematic fevers; and inflammation of the uterus, bladder, or urethra.

Morbid Anatomy and Pathology.—The affected portion of the cord is sometimes reduced to the consistency of thick cream; in other cases, however, it is but slightly altered, either in appearance or firmness. When all the tissues of the cord are involved in the lesion, the gray and white matter have the appearance of being blended together, giving a homogeneous aspect to the entire section. Examined with the microscope, the tissues of the cord are found to have undergone fatty and granular degeneration, the constituents consisting chiefly of oil-globules, débris of nervous matter, and broken-down connective tissue. Such changes must necessarily impair the functions of the cord, both as a centre of reflex action and as a transmitter of sensory and motor impressions to and from the brain.

Symptoms.—The first symptom to attract attention, in most cases, is numbness in the parts below the seat of disease. This is followed by a gradually advancing paralysis in the same parts, accompanied by a corresponding loss of sensation. There are no pains, muscular twitchings, spasms, or contractions in the paralyzed limbs, nor any suffering at the seat of lesion.

Owing to implication of the bladder and rectum, the patient gradually loses control over their contents. At first he has more or less difficulty in evacuating the bladder, while the desire to urinate becomes more frequent. At last both the sphincter and detrusor urinæ become completely paralyzed, so that, having neither power to retain or expel the urine, it constantly dribbles away. The same is true of the bowels, which either lack the power to expel their contents, or else the evacuations take place prematurely from relaxation of the sphincter ani.

Sooner or later the patient is confined to his bed or couch, and at last becomes utterly helpless. The parts below the seat of the lesion lose all control over their functions, bed-sores occur, the fæces and urine are passed involuntarily, and, although the patient may possibly live for years in this condition, he eventually dies either of decubitus or of some intercurrent disease.

The above description applies to the disease as it is generally met with in the lower part of the cord. In some cases, however, the softening is limited to the antero-lateral columns, in which case only the power of motion is lost, sensibility remaining unaffected. On the other hand, when the disease is confined to the posterior columns, the symptoms are, of course, reversed; the cutaneous and muscular sensibility are impaired, while the power of motion remains intact. When the lesion involves the upper portion of the cord, the parts which are in anatomical relation with it are implicated, producing corresponding thoracic and visceral symptoms, difficulty in respiration and deglutition, etc.

Varieties.—The varieties which are numerous and based chiefly on anatomical considerations, are usually described as so many varieties of myelitis. Thus, when a small area or focus of softening exists, involving only a very limited portion of the transverse area of the cord, we have a "circumscribed" softening; and when such circumscribed patches are scattered through different regions of the cord, it is said to be "disseminated." Again, the softening may occupy the entire diameter of the cord, constituting what is called "complete transverse" softening; or it may be limited to the anterior, central, or posterior tracts, and thus constitute the "incomplete transverse" softening. When the change involves both the white and gray matter for a considerable extent, we have what is known as "diffuse" softening of the cord; and when this diffuse softening is limited to the gray matter of the cord, we have "diffuse central" softening.

Diagnosis.—The negative symptoms in this disease are no less important, in a diagnostic point of view, than the positive; since there is no other known disease of the cord, unless it be a form of spinal anæmia, which is not characterized, at one time or another, by some degree of sensory or motor excitement. But in this affection there are no pains or exalted sensibility, nor any muscular twitchings, spasms, or contractions, even when the whole structure of the cord is involved in the disease.

Prognosis.—As in myelitis, the disease is more fatal to life when located high up in the spinal canal than when the morbid process is seated in the lower dorsal, lumbar, or sacral regions of the cord. In the latter case the prospect of recovery is no better than in the former, but it is not necessarily fatal. A patient with this disease may, if the lesion be situated in the lower portion of the cord, live many years completely paralyzed below the seat of injury, and finally die of some other disease; but the bladder troubles which supervene are liable to cause death by exciting inflammation and other intercurrent affections.

Treatment.—It is possible that something may be done to arrest or retard the softening process in the cord; but it is not likely that the diffluent portion of the cord can ever be restored to its former state of integrity. In case the disease is recognized at an early period, before the disorganizing process has made any considerable progress, we may hope, by the administration of such remedies as *Calcarea carb.*, *Calcarea phosphorica*, *Phosphorus*, *Picric acid*, *Silicea*, etc., to arrest its onward progress, and, by increasing the functional activity of the normal constituents of the cord, compensate to some extent for the injury already inflicted on the spinal centre. In case of improvement, however, there will always be more or less doubt as to the correctness of the diagnosis, owing to the obscurity which always attends the disease in its earlier stages.

Much, however, may be done toward rendering the patient more comfortable and prolonging his life. Thus the weakened cord should be guarded against any further injury by carefully avoiding any sudden jar or fall; bed-sores should be prevented, or promptly and methodically treated; and the bladder should be emptied with regularity, either spontaneously or by means of the catheter. Passive exercise in the open air should also be taken as long as practicable, and a good, wholesome, and nourishing diet enjoined.

SPINAL MENINGITIS.

Synonyms.—Inflammation of the membranes of the spinal cord, Meningitis spinalis; French, Méningite spinale. *a.* Dura mater: Spinal pachymeningitis; French, Pachyméningitis spinale. *b.* Arachnoid: Spinal arachnitis; French, Arachnite spinale. *c.* Pia mater: Spinal leptomeningitis; French, Leptoméningite spinale.

Definition.—Spinal meningeal inflammation may be limited to the spinal dura mater (*spinal pachymeningitis*), to the pia mater and arachnoid (*spinal leptomeningitis*), or it may involve all three of the spinal membranes. As the inflammation is usually limited to the soft membranes of the cord, it is immaterial whether we call it *spinal meningitis* or *spinal leptomeningitis*, as these terms are now generally used synonymously.

Varieties.—Besides the distinctions above made, spinal meningeal inflammation may be either *acute* or *chronic*, *simple* or *tubercular*. The simple and tubercular forms, though pathologically different, are so closely related, clinically and anatomically, that nothing would be gained by considering them separately. They both involve the pia mater, and may exist either as separate affections within the spinal canal, or may be combined with similar conditions at the base of the brain. In the latter forms we have either a *simple cerebro-spinal meningitis* or else a *tubercular cerebro-spinal meningitis*. When leptomeningitis involves the membranes at the base of the brain and the spinal meninges simultaneously, we have the *Epidemic Cerebro-Spinal Meningitis*, which will be described in a separate article.

Ætiology.—The ætiology of tubercular spinal meningitis differs in no respect from that of general acute tuberculosis, of which it is a manifestation. Hence, all those influences which favor the development of the general affection, such as being badly fed, and living under unfavorable sanitary conditions, act as exciting, as well as predisposing, causes of the disease.

The chief exciting causes of the simple or non-tubercular form are: exposure to severe cold, or to cold and damp; syphilis, rheumatism, and other diseases; fracture and dislocation of the vertebræ; wounds involving the spinal cord or its membranes; concussion of the spine, etc.

Morbid Anatomy and Pathology.—The anatomical appearances correspond to the different stages of the inflammatory process. First, we have the hyperæmic stage, characterized by increased vascularity of the pia mater; second, the stage of effusion and transudation, in which, in addition to the hyperæmia, we meet with more or less serum, lymph, and pus in the meshes of the pia mater; and, third, in chronic cases, we find the unabsorbed products of inflammation, namely, opacities and thickenings of the pia mater and arachnoid membranes, which adhere to each other and to the spinal cord, the latter also exhibiting, perhaps, more or less sclerosis and atrophy, especially at its periphery.

The tubercular variety is marked by similar changes, but with this difference, that gelatinous serum and greenish-yellow lymph take the place of actual pus in the subarachnoidean space; and there may also be discovered, in the vicinity of the spinal vessels, the characteristic tubercular deposit in the form of minute whitish or yellowish-white granulations.

The spinal nerve-roots, in both forms of the disease, participate in the inflammation, appearing softened and swollen, and so pressed upon by hyperplastic products as to render the fibres indistinct.

The spinal cord itself partakes in the inflammatory process,* the anatomical changes having the characteristics of a transverse disseminated myelitis, involving both the white and gray matter † (*myelomeningitis*).

Symptoms.—The acute form generally sets in with a chill, which is soon followed by fever. A deep-seated pain is soon felt in the back, which is increased by movements of the body more than by pressure over the affected portions of the spine. This pain, which is referable to the posterior roots of the cord, extends, at times, to the trunk and extremities, especially when the patient attempts to move. Muscular contractions, from excitation of the anterior roots, may coexist with the pains, producing, in severe cases, opisthotonos, dyspnœa, rigidity of the limbs, and other symptoms, according to the particular muscles affected. When the posterior roots are involved, there is marked hyperæsthesia of the skin, muscles, and joints, rendering the patient irritable, and unwilling to be touched or moved. During this stage of reflex excitability there is also retention of urine and constipation.

The second stage is characterized by symptoms of paralysis. The power of motion is impaired in all the parts of the body supplied by nerves from below the seat of lesion, but the paralysis is not complete unless the cord itself is affected. As the disease progresses, however, the limbs become entirely motionless, there is incontinence of urine and fæces, anæthesia of the skin and, in most cases, a very high temperature and rapid pulse. Death generally takes place within one or two weeks, from asphyxia in consequence of spasm of the respiratory muscles, or more frequently, perhaps, from paralysis of the respiratory nerves.

In subacute and chronic cases the symptoms are of the same general character, but less pronounced, and subject to greater variations; though in all cases the grouping of symptoms varies, according as the inflammation is more or less localized or general, to the extent to which the spinal cord is involved, and to the presence or absence of cerebral and other complications. Chronic cases are often very protracted, getting apparently better and worse alternately, but at last they generally terminate fatally from decubitus and insufficient oxidation of the blood. Even when life is preserved, which is very rarely the case, the patient never fully recovers, but remains more or less emaciated, anæsthetic, and paralyzed.

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* Schultze in Ber. Klin. Wochenschrift, 1876, No. 1.

† Hammond, op. cit., p. 444.

Diagnosis.—The symptoms of spinal meningitis are sufficiently characteristic to prevent any error in diagnosis, viz.: fever; pains in the back and limbs, greatly aggravated by movement; muscular rigidity similar to, but less severe and general than, that of tetanus; dyspnœa; hyperæsthesia of the skin; and retention of urine and fæces, followed in the later stages by more or less paralysis of the limbs, cutaneous anæsthesia, and incontinence of fæces and urine.

The presence of cerebral symptoms is apt to obscure the diagnosis; but, on the other hand, their absence in any case is sufficient evidence that the disease is not tubercular in its nature.

In regard to which membranes are affected, if the disease is idiopathic or cerebro-spinal, it is almost certain to be a leptomeningitis; and on the other hand, if traumatic, or secondary to caries of the vertebræ, with bed-sores, etc., it is equally certain to be a pachymeningitis, inflammation of the spinal dura mater being almost invariably of traumatic or secondary origin.

Prognosis.—The prognosis of spinal meningitis has already been given with sufficient definiteness under the head of *Symptomatology* (*q. v.*).

Treatment.—Therapeutics.—Aconite.—High fever; boring pain in the spine, increased on motion; painful stiffness in the small of the back, extending to the neck; numbness extending from the small of the back into the lower limbs; formication in the arms; spasms produced by spinal inflammation; the arms hang powerless, as if paralyzed; insensibility and coldness of the hands and feet.

Belladonna.—Tonic muscular contractions; painful stiffness in the back of the neck; cramp-like pain in the middle of the spinal column; lancinating pains in the vertebræ, resembling stabs with a knife; complete or incomplete paralysis, with or without incontinence of urine; intense dyspnœa, as if the chest were violently compressed.

Causticum.—Painful stiffness in the back; pain in the muscles of the extremities; great heaviness and weakness in the arms and legs; limbs cold, numb, and insensible.

Cuprum.—Rigidity, with painful contractions of the limbs, toes, and fingers, excessive weakness, especially in the lower extremities; incontinence of urine; suffocative breathing from spasm of the respiratory muscles.

Hypericum.—Fever, with wild, staring looks, hot head, bloated face, throbbing of carotids, violent thirst, white-coated tongue, and beating headache; painfulness of the back, from injuries of the spine, greatly increased by motion; the cervical vertebræ sensitive to the touch; the slightest movement of the spine extorts cries.

Mercurius.—Violent deep-seated pains in the back, increased by movement; great restlessness and insomnia, especially at night, or when warm in bed; paralysis of the lower limbs, bladder, and rectum; anæsthesia of the skin.

Nux vom.—Violent pains in the back, especially in the dorsal region; pains extending from the back to the sternum, and producing shortness of breath; numbness and weakness of the arms and legs; retention of urine and constipation.

Physostigma.—Stiffness and pain all along the spine, with tonic spasms; back and limbs weary and weak; inclination to bend forward, as if hard to sit erect; paretic debility.

Plumbum.—Fever, with great heat and thirst; pulse small and intermittent, especially during the spasms; also in chronic cases, where there are painful muscular contractions, with atrophy, and frequent spells of colic; coldness and paralysis of all the limbs, especially the lower.

Rhus tox.—High fever from spinal meningitis, especially when caused by exposure to cold and damp, or by concussion; dyspnœa from constriction of the chest; paralytic weakness of the extremities; numbness, with tingling and loss of sensibility.

Secale corn.—Spinal meningitis, attended with suppression of urine, spasms of the muscles of the chest and extremities, and followed by paralysis, numbness, and insensibility.

Auxiliary Treatment.—Local applications are of very doubtful propriety in acute cases. Nothing short of the actual cautery will prove permanently beneficial to the diseased tissues, though ice-bags laid along the spine may give more or less relief to the pain. Electricity may be employed to advantage in chronic cases, being careful to use the primary galvanic current to the spine, and the secondary, or induced, current to the paralyzed limbs.

The patient should lie either on his side or face, on a comfortable bed, and in a large, airy, and quiet room. His diet should be of the most nourishing description, such as animal broths, soups, eggs, and milk, with a moderate amount of stimulants when required. Great care should be taken to relieve the bladder and rectum; bed-sores should be prevented as long as possible, and after they have formed they should receive careful attention.

ACUTE ASCENDING PARALYSIS.

Synonyms.—Landry's paralysis, Acute progressive paralysis; Paralysis ascendens acuta; (Fr.) Paralysie ascendante aiguē; (Ger.) Paralysis ascendens acuta.

Definition.—An acute disease of the spinal cord, which, though characterized by a rapidly progressive paralysis, is unattended by any appreciable anatomical lesion.

Ætiology.—The affection occurs principally in individuals between the ages of twenty and forty years, and is much more common in males than in females. Hence syphilis is thought, by many, to have some ætiological connection with the disease. The same is true of exposure to cold and damp, hard labor, spinal concussion, etc., though what influence, if any, these several antecedents may have in exciting the disease cannot at present be determined.

Morbid Anatomy and Pathology.—No anatomical changes have, as yet, been discovered in the spinal cord or its membranes, not even so much as hyperæmia. Dr. Hammond, however, who regards the disease as only a more acute and advanced form of the affection next to be described (*spinal paralysis of adults*), regards its "patho-anatomical position as depending upon inflammation of the anterior tract of gray matter," but this opinion is not shared to any considerable extent by other pathologists. On the contrary, the pathological process is supposed to consist in some peculiar disturbance of nutrition, the anatomical elements of which are inaccessible to our present means of investigation.

Symptoms.—The disease may or may not be preceded by prodroma. In the former case, a slight fever is apt to manifest itself from time to time, with more or less numbness in the hands and feet, and a feeling of malaise or weariness. This stage, when present, generally lasts but a few days, though it may be extended to several weeks.

After this stage is passed, the paretic condition becomes more pronounced, and is soon followed by actual paralysis, which, beginning in the most remote members, rapidly extends to the trunk, so that in the course of a few hours, or days, the lower extremities become completely paralyzed.

As the disease progresses, the muscles of the trunk, and afterwards those of the upper extremities, become gradually implicated, the paralysis proceeding, as before, from the periphery towards the centre, until all the limbs become powerless, and the patient is wholly unable to help himself, or even to turn in bed. It is a singular fact, however, that although the paralysis becomes more and more general, the lower sphincters usually escape. Defecation may, it is true, be rendered difficult, but this is owing to paralysis of the abdominal muscles, which also has a similar effect upon respiration.

The disease runs its course without involving the general sensibility to any great extent, and also without producing any marked atrophy of the muscles, or any change in their electrical excitability. There are no pains in the spine or limbs, no muscular contractions, and no tendency to the formation of bed-sores; in short, paralysis is the one grand symptom, the separate existence of which mainly characterizes the disease.

Notwithstanding these favorable symptoms, however, more than half the cases terminate fatally within a few days, or weeks, by asphyxia, in consequence of the disease reaching the medulla oblongata. Even before this stage is reached, respiration, articulation, and deglutition are seriously interfered with; and in some rare cases these symptoms manifest themselves at the outset, in consequence of the disease beginning in the medulla or in the cervical region, and pursuing a descending, instead of an ascending, course.

Diagnosis.—This disease is liable to be confounded with the *acute spinal paralysis of adults*, next to be described, and also with subacute forms of spinal paralysis; but it may be distinguished from them (1) by the absence of rapid muscular atrophy, and (2) by the fact that the electrical excitability of the muscles remains unimpaired. In very acute cases, in which sufficient time does not elapse to render these conditions possible, the distinction may be based upon the regularly progressive character of the disease, in which respect it differs from acute spinal paralysis where the impairment of muscular power occurs simultaneously in every part affected.

Prognosis.—This has been already sufficiently indicated. About two-thirds of all the cases terminate fatally, and this result usually occurs within a week or ten days, sometimes in the course of only three or four days. As a general rule, the more rapid the progress of the disease, the greater the probability of its reaching the medulla and proving fatal. It occasionally happens, however, that very severe cases improve under treatment, and even end in recovery.

Medical Treatment.—We have not had much experience with this particular form of paralysis, *as such*, though doubtless it has been often cured homœopathically, as the absence of any material spinal lesion places it, if not among the functional neuroses, at least in the category of curable diseases. As we shall have occasion to give special indications for the treatment of various forms of paralysis in subsequent articles, it will be best to give here only such as appear particularly applicable to this form of spinal paralysis.

Therapeutics.—**Arsenicum.**—Anæmic and debilitated cases, or where the weakness is such as to oblige him to lie down, with inability to leave the bed.

Aluminium met.—While the paralysis is confined to the lower extremities, or when there is so much heaviness of the legs that the patient can scarcely drag them, or when he is obliged to sit down, and experiences great weariness even when sitting.

Cocculus.—Paralysis occurring in debilitated nervous patients, and where the circulation is defective.

Dulcamara.—Simple paralysis of the extremities, where general sensibility is unaffected, but where the circulation is so interfered with as to produce an icy coldness of the surface.

Ferrum acet.—Anæmic and weak individuals who experience such heaviness of the limbs as to produce an irresistible disposition to lie down.

Gelsemium.—Complete paralysis, where the muscles have only lost the power of contracting at the will of the patient, there being no loss of sensation, nor any change of temperature.

Nux vom.—Paretic conditions, or where the power of voluntary motion is not wholly lost.

Phosphorus.—Where the trouble is confined to the extremities, and seems to depend upon perverted nutrition.

Sulphur.—In the more protracted cases, and also in leuco-phlegmatic constitutions, especially if there is a psoric taint of the system.

Consult also the following remedies: *Æsculus glab.*, *Arnica*, *Belladonna*, *Bryonia*, *China*, *Colchicum*, *Kali iod.*, *Mercurius*, *Natrum mur.*, *Oleandra*, *Plumbum*, *Rhus tox.*, *Secale cor.*, *Veratrum alb.*, *Veratrum vir.*, *Zincum*, *Zincum phos.*

Every effort should be made to build up the system by prescribing a nutritious but easily digestible diet, fresh air, and such exercise, either active or passive, as may best suit the condition of the patient.

The constant galvanic current to the spine, and weak faradic currents to the affected limbs and muscles, should be applied daily; and the functional activity of the affected parts should also be farther encouraged by frequent frictions and shampooings with the hand, aided, if necessary, by stimulating liniments and embrocations; electro-massage is also a useful adjunct in these cases.

SPINAL PARALYSIS OF ADULTS.

Synonyms.—Atrophic spinal paralysis, Inflammation of the anterior horns, Poliomyelitis anterior; (Fr.) Paralysie spinale atrophique; (Ger.) Spinallähmung bei Erwachsenen, Poliomyelitis anterior.

Definition.—A form of paralysis in the adult, due to inflammation and degeneration of the gray matter of the anterior horns of the spinal cord.

History.—Various forms of acute, subacute, and chronic paralysis have been described by different observers as occurring in the adult, which, from their resemblance to *infantile spinal paralysis*, are believed to be essentially the same disease, modified only by the age of the patient and other accidental circumstances. This fact has now received the general recognition of pathologists, most of whom, regarding the affections in question as mere varieties of one and the same disease, refer them to the head of "*spinal paralysis in the adult.*"

Ætiology.—Nothing is positively known as to the ætiology of this affection. Exposure to cold and damp appears to be the most common exciting cause; at least it is most frequently found to precede the setting in of the disease. The disease has also been observed to follow venereal excesses, syphilis, measles, dysentery, sudden suppression of the menses, violent straining, spinal concussion, and other like agencies, but many cases occur without any apparent cause.

Pathology.—The anatomical lesions are similar to those met with in infantile spinal paralysis, being almost entirely confined to the anterior horns of gray matter, the nerve-cells of which have undergone atrophy and yellow pigmentation. Hence, the pathology of the disease is similar to that of the infantile form (*q. v.*).

Symptoms.—The symptoms vary considerably, according as the disease is acute or chronic. In the former case, the paralysis is generally sudden and complete. The patient is seized with a severe pain in the back, shooting into the limbs, and accompanied with numbness and loss of motor power. These cases are usually attended with some degree of fever, and an increase of temperature in the affected members. The pains in the limbs are not always present, and when they are, they generally subside in the course of two or three days.

In the subacute and chronic varieties the paralysis is more gradual in its approach. It generally commences in the lower extremities, becomes more and more pronounced, and finally involves the upper parts of the body, especially the arms. More or less pain is usually felt, at first, in the back and legs, but there is often little or no fever, and the temperature of the affected limbs, instead of being higher than normal, is commonly lowered.

The bladder and rectum generally escape altogether, but occasionally they become slightly involved, and the patient may even temporarily lose control of them.

The paralysis may follow an ascending or descending course, may involve one or both sides of the body, or be confined to either the upper or lower extremities, as in the infantile form; but the temperature is never so greatly reduced, nor are secondary deformities ever developed to so great an extent, as in infantile spinal paralysis—circumstances easily accounted for by the age of the patient.

The disease is sometimes complicated with conditions which do not belong to the simple form of the affection. Thus, a few cases have exhibited more or less paralysis of the face; others, cutaneous and muscular hyperæsthesia; sometimes there is incoördination as well as paralysis; at others, cephalalgia, vertigo, and other head symptoms.

The electro-excitability of the muscles is always more or less impaired, and generally in proportion to the extent of the paralysis.

Reflex excitability is usually lost at an early stage of the disease. The cutaneous sensibility, on the other hand, is seldom affected.

In the course of a few weeks or months the paralysis generally begins to recede, but it is apt to continue in some of the muscles, as in infantile spinal paralysis. The parts that remain paralyzed usually become atrophied, the muscles in some cases being very rapidly and extensively wasted. This muscular atrophy, though not generally so profound as in many cases of infantile paralysis, is nevertheless one of the most striking features of the disease. I once met with the disease in a middle-aged woman of corpulent habit, the calves of whose legs were reduced to less than one-third of their natural size.

Diagnosis.—The leading symptoms of the disease are sufficiently characteristic to distinguish it from every other form of paralysis. We have only to remember the variety of forms which the paralysis may assume; that it is generally followed, but never preceded, by atrophy; that the bladder and rectum are not usually implicated; that sensibility is seldom much disturbed; that there are no bedsores; and that the reflex and electrical excitability of the muscles is always more or less diminished.

Prognosis.—Unless promptly arrested by treatment, the more acute forms are liable to involve the medulla oblongata, and so produce death by asphyxia. So far as life is concerned, however, the prognosis is not generally very unfavorable, for even after the respiratory nerves become implicated the disease may be arrested and the patient cured. As to the restoration of muscular power and development, that will depend upon the degree of electro-excitability remaining in the affected muscles. So long as they can be made to respond to either the primary or induced current, the prospect of recovery may be regarded as favorable, but not otherwise.

Treatment.—The treatment proper for the first, or acute, stage differs in no respect from that of *spinal hyperæmia* and *myelitis* (*q. v.*). After the congestion and inflammation of the cord have been subdued, the treatment should be similar to that recommended for *infantile spinal paralysis* and *progressive muscular atrophy* (*q. v.*).

Auxiliary Treatment.—This consists chiefly in the methodical application of *electricity*. The form to be employed will depend upon the electrical susceptibility of the paralyzed muscles. If the induced or faradic current will cause contractions, that form should be preferred; but if not, then the interrupted galvanic current should be used, the strength of the current being sufficient to produce contractions. Massage is also useful in these cases, especially the *electro-massage* of Dr. Butler.

PSEUDO-HYPERTROPHIC SPINAL PARALYSIS.

Synonyms.—Pseudo-hypertrophic muscular paralysis, Lipomatosis muscolorum luxurians; French, Paralysie pseudo-hypertrophique, Paralysie myosclèrosique, Paraplégie hypertrophique de l'enfance; German, Atrophia musculorum lipomatosa, Muskel-atrophie mit interstitieller lipomatose.

Definition.—A progressive paralysis, caused by inflammation of the anterior tract of gray matter of the spinal cord, in which certain muscles appear to be hypertrophied, although the ultimate fibres of the affected muscles atrophy.

History.—There are four diseases of the spinal cord the symptoms of which bear such a striking resemblance to each other, in certain particulars, as to leave very little doubt, irrespective of the morbid changes in the cord, that they all belong to one and the same group. They are: (1) Progressive muscular atrophy; (2) Infantile spinal paralysis; (3) Spinal paralysis of adults; (4) Pseudo-hypertrophic spinal paralysis. The first two of this group having been described in other parts of this work, only the two latter are included in the present section.

Ætiology.—Pseudo-hypertrophic paralysis is almost exclusively a disease of infancy and childhood; two or three cases, however, have been reported in adults. Heredity appears to be a predisposing cause in some cases, the disease always occurring on the mother's side, but not in the direct line. The exciting causes are not known.

Morbid Anatomy and Pathology.—Although one or two observers have failed to find any organic lesions in these cases in the spinal cord, others, more successful, pronounce the anterior horns of gray matter more or less affected. Thus, Dr. Lockhart Clarke, among other changes, found disintegration of the gray substance of the anterior and central portions of each lateral half of the cord; Dr. Bath not only found the lateral columns in a state of sclerosis, but the anterior horns of gray matter were extensively atrophied, the nerve-cells greatly diminished in number, and the others wasted; Müller also found degeneration of the lateral columns of the cord, together with atrophy of the ganglion-cells of the anterior horns.

The muscular hypertrophy appears to be due to proliferation of the adipose and connective tissues, probably in consequence of morbid nutrition.

Symptoms.—The disease is characterized by a gradually advancing paralysis of the lower extremities, accompanied by an enlargement of the gastrocnemii muscles, and afterwards of those of the thigh and gluteal region. In order to give greater steadiness in standing and walking, the child props himself instinctively by separating his legs, thus giving to the gait a peculiar waddling character, somewhat resembling that of a duck or pigeon.

The muscles of the trunk, as well as those of the upper extremities, may also become involved, but the degenerative process advances at a much slower rate than it does in the lower extremities. In one or two cases the tongue and facial muscles have likewise become hypertrophied.

Owing to weakness of the erector spinæ muscles, the lumbo-sacral region of the spine becomes remarkably incurved, causing the posterior part of the upper dorsal region to overhang, as it were, the sacral.

As the paralysis progresses, locomotion and standing become more and more difficult, and finally the child is compelled to remain in the recumbent position.

In some cases the muscles of the trunk and upper extremities undergo atrophy instead of enlargement, and the same is true occasionally of those of one or the other of the lower extremities, some of the paralyzed muscles undergoing hypertrophy and others atrophy simultaneously in the same individual.

Occasionally, also, after a period varying from two to six years, the hypertrophied limbs gradually diminish in size until they appear more or less shrunken. In one case, mentioned by Hammond, there was a second stage of hypertrophy following the secondary atrophy.

As the disease advances, and the lesion ascends the spinal cord, the respiratory muscles are liable to become affected, cerebral disturbances ensue, the mental powers become weakened, and at last the patient succumbs to exhaustion or some intercurrent affection.

Diagnosis.—The disease is not likely to be confounded with any other affection of the spinal cord, provided due attention be paid to the history of the case and to the characteristic symptoms.

Prognosis.—The prognosis in this disease could not well be worse than what it is, for although death is seldom, if ever, the direct result of the disease, the latter is almost certain to terminate fatally in the course of a few years, either from exhaustion, bronchitis, pneumonia, or some other intercurrent affection.

Treatment.—The treatment differs in no essential respect from that recommended under *Progressive Muscular Atrophy, Infantile Spinal Paralysis, and Spinal Paralysis in Adults* (*q. v.*).

SPASMODIC SPINAL PARALYSIS.

Synonyms.—Primary or idiopathic lateral spinal sclerosis, Paralysis spinalis spastica; French, Tabes dorsal spasmodique; German, Spastische spinalparalysie, Primäre Lateralsklerose des Rückenmarks, Primäre Sklerose der Seitenstränge des Rückenmarks.

Definition.—A spasmodic paraplegia, caused by a symmetric and systematic primary sclerosis of the lateral columns of the spinal cord.

History.—This disease was first described by Erb, in 1875, though he was partly anticipated by Türck and Charcot, the latter of whom subsequently investigated the disease anew, and pointed out its probable pathology. It was reserved, however, for Dr. Dreschfeld[*] to confirm the truth of their deductions by the only reliable post-mortem examination yet made of the disease.

Ætiology.—The disease occurs mostly in males between the ages of twenty and fifty years. Erb, Bastian, and others,[†] have described cases of spasmodic paralysis in children which are supposed to be forms of this disease, but whether they were so, or not, is doubtful.

In many cases no possible cause can be assigned; in others, however, the disease appears to owe its origin to such causes as blows, falls, and other traumatic influences, exposure to cold and damp, sexual excesses, etc.

Morbid Anatomy and Pathology.—The morbid alteration called sclerosis consists of proliferation and hardening of the neuroglia of the cord, with simultaneous wasting of the nerve-cells and fibres. Charcot has shown that these changes occur to a greater extent in the cervical portion of the cord than elsewhere, the sclerosed condition, when this part is affected, extending as far as, and even beyond, the outer angle of the anterior horn of gray matter, while posteriorly it almost reaches the posterior tract of gray matter. As we descend the cord, it becomes more and more circumscribed, while at the same time it approaches closer and closer to the cortical layer, until in the lumbar portion of the cord it touches the cortical layer, and at the same time only occupies about one-fourth of the area of the lateral columns. When it extends to the medulla oblongata it is confined to the anterior pyramids, and does not involve the nuclei of the bulbar nerves, as in the amyotrophic form of lateral spinal sclerosis. These changes, it will be seen, are in perfect harmony with what is known concerning the physiological action of the lateral columns of the cord (see *Introduction*).

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[*] Brit. Med. Jour., Jan. 29, 1881, p. 152.

[†] Charcot on Dis. of the Spinal Cord, Cincinnati, 1881, p. 150.

Symptoms.—The characteristic symptoms of this affection are paralysis and contraction of the upper and lower extremities, especially the latter. The paralysis takes place very gradually, and is seldom complete. The patient first complains of simple weakness. He finds that he becomes easily fatigued, and that very slight exertions tire him. This is especially noticeable in walking, the patient frequently stumbling, and sometimes even falling, from weakness of the muscles of the leg and foot. When the extensor muscles become too weak to enable him to raise his feet entirely clear of the ground, he swings them around by means of the abductor muscles of the thigh, as we sometimes see in patients suffering from extended ankylosis of the knee-joint. There is also in these cases a similar lack of elasticity in the movement, the foot striking the ground in the same abrupt and jerking manner. In other cases the patient manages to raise his feet sufficiently high to clear the ground by tipping his body alternately from side to side, thus giving to his gait a characteristic waddling appearance. In either case the patient requires the assistance of a cane, or some other means of support.

The tonic contractions which supervene are an equally prominent feature of the disease, sometimes affecting one set of muscles and sometimes another, but chiefly the adductors and flexors. Sometimes the contractions relax, but only to recur again, and it is not until the power of the cord becomes entirely exhausted that complete relaxation of the paralyzed muscles is established.

The reflex excitability of the muscles, instead of being diminished, is generally increased. This is especially true of Westphal's symptom of the "tendon-reflex," for if one leg is crossed upon the other, and the ligamentum patellæ is struck forcibly with the edge of the hand, the leg springs considerably higher than it does in the healthy subject. The muscles respond normally to the electric current, showing that the electric excitability remains unimpaired.

The skin is more or less hyperæsthetic, and the muscular sensibility is also increased. The muscles are usually painful on pressure, and lancinating pains are often experienced in the back and limbs.

When the lateral columns are affected throughout their entire length, the muscles of the neck and trunk, as well as those of the extremities, are stiff and painful, the muscles of the extremities strongly contracted, and the limbs flexed.

Sudden painful movements, of a spontaneous or reflex character, occur from time to time in the limbs, with intervals of quiescence between them.

Sometimes the symptoms so far abate as to leave only a feeling of weakness in the lower extremities, and a certain degree of contraction in the upper, but the improvement is only temporary, for the disease is not only chronic, but essentially progressive in its character.

Diagnosis.—The diagnosis is chiefly based upon the characteristic symptoms of the disease, namely, paralysis with contractions, but without atrophy of the muscles (except such as results from non-use), pain in the back and limbs, and the absence of any lesion of the brain or medulla oblongata capable of accounting for the disease as a secondary disorder. Although the contractions are pathognomonic of lateral spinal degeneration, it is only by the clinical history of the case that the distinction between primary and secondary lesions of these columns can be satisfactorily made out. And as to the difficulty of distinguishing between the symptoms of this disease and those of chronic spinal meningitis, multiple spinal sclerosis, and tumors pressing on the cord and giving rise to similar phenomena, it cannot be better expressed than by Dr. Hammond, who says he knows of no sure signs by which, in the present state of our knowledge, the discrimination can be made.

Prognosis.—Something may, perhaps, be done in the way of treatment to retard the progress of the disease, but entire recovery is out of the question. Atrophied nerve-tissue can never be restored.

Treatment.—Little benefit can be expected from the exhibition of medicine in these cases unless the disease is seen early, before the nerve-cells have become greatly wasted by compression and extensive contractions have set in, and even then we can only hope to retard the progress of the disorder by increasing the nutrition of the cord. If, however, the disease has a syphilitic origin, which may occasionally happen, good results may be expected from the judicious administration of *Mercurius*, Kali iod., and other anti-syphilitic remedies.

General Indications.—**Argentum nit.**—Paraplegia accompanied by rigidity of the affected muscles.

Aluminium met.—Paralysis confined to the lower extremities and of spinal origin.

Phosphorus.—Incomplete paralysis of the lower extremities, of spinal origin, or where there is fatty degeneration of the muscles.

Plumbum met.—Complete paraplegia, with or without general atrophy.

Secale corn.—In emaciated subjects.

See also remedies and indications under the head of *Paraplegia*.

Auxiliary Treatment.—The constant galvanic current (primary)

has appeared to be of some benefit in these cases, especially
ing the contractions.

AMYOTROPHIC LATERAL SPINAL SCLEROSIS.

Synonyms.—Inflammation of the lateral columns of t
cord and of the anterior tract of gray matter; French, Scléro
amyotrophique.

Definition.—A form of lateral sclerosis which, beginni
cervical portion of the cord, extends to the lumbar region,
the anterior horns of gray matter, and finally proves fatal
cating the medulla oblongata.

History.—Amyotrophic lateral sclerosis was formerly r
a peculiar form of progressive muscular atrophy. It differs
affection, however, by being a true paralysis, associated wit
dependent on, atrophy of the affected muscles, and by bei
panied with permanent spasmodic contractions.

Ætiology.—The disease has in several instances spee
vened on exposure to cold and dampness. In most cases
no exciting or predisposing cause has been manifest.

Morbid Anatomy and Pathology.—The lateral co
found on post-mortem examination to be symmetrically
and the anterior horns of gray matter symmetrically atro
degenerated, the latter being confined to the anterior horn
sisting of atrophy, loss or diminution of nerve-cells, and p
degeneration.

Charcot,* who first separated the disease pathologically
gressive muscular atrophy, says of it: "I propose to call t
in which the two systems of the pyramidal fasciculi are aff
in the cord and in the medulla oblongata, *amyotrophic later*
only the lesion cannot be followed upwards ordinarily b
cerebral peduncle. The alteration reacts on the gray subst
anterior cornua of the cord and on the analogous gray p
medulla oblongata; and it follows two methods. In certai
is a destructive lesion of the cellular elements. The cons
then, an atrophy of the muscles which are in relation with
emanating from the diseased gray substance. In other p
simple irritative functional lesion of the ganglionary elem
result, in the parts, besides the paralysis more or less p
there is a notable exaggeration of the tendinous reflexions
at a certain moment, a considerable contracture, occasion
members. The contracture, or in its absence the exaggera
tendinous and muscular reflexions, distinguishes clinically

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* Op. cit.

to my observation, this form of spinal muscular atrophy from that in which the cellular elements are destroyed without any participation of the white fasciculi."

Symptoms.—The characteristic symptoms are: 1st, a paralysis, more or less pronounced, affecting the muscles of one or more of the extremities; 2d, general atrophy of whole groups of the affected muscles; 3d, fibrillary contractions, which both precede and accompany the atrophy; and 4th, permanent contractions of the affected limbs, due chiefly to spasmodic contractions of the non-paralyzed or partly paralyzed muscles.

The paralysis, which generally sets in gradually, in the upper extremities may involve one or more limbs at the same time. In some cases it is confined for a considerable length of time to a single limb or to one side of the body, but eventually both sides become affected. Occasionally it begins in the lower extremities instead of the upper, gradually ascending as it progresses. Sooner or later the lips, the tongue, the palate, the larynx, and the neighboring parts become involved, giving rise to difficult deglutition and articulation, and sometimes entirely abolishing the power of speech.

The muscular atrophy, which soon follows the appearance of the paralysis, usually keeps pace with the latter, causing a general atrophy of the paralyzed muscles. When it involves the tongue, the organ shrinks, becomes wrinkled, and, according to Charcot, is agitated with vermicular movements.

The fibrillary twitchings which affect the atrophied muscles precede as well as accompany the wasting, as in progressive muscular atrophy. They become more and more marked, however, as the atrophy advances, thus indicating the extension of the disease.

But the most characteristic symptom of the disorder is the spasmodic contractions of the limbs. These contractions, though chiefly due, as already stated, to spasmodic contractions of the non-paralyzed or partially paralyzed muscles, are, according to Charcot, partly due to paralysis of certain antagonistic muscles.

At first the contractions occasionally relax, but they soon set in again, and continue, with greater or less intensity, until the closing stage of the disease, when the muscles, having become completely wasted as well as paralyzed, are incapable of maintaining the contractions.

Sensibility is affected to a considerable extent in most cases, there being not only more or less numbness in the affected parts, but severe paroxysmal pains are sometimes experienced, especially when any attempt is made to overcome the contractions.

As already stated, the disease extends from below upward, and may eventually implicate the medulla oblongata. We then have the symptoms of progressive bulbar paralysis superadded to those of

neither do spasmodic contractions occur in it, as i
lateral sclerosis of the cord.

Prognosis.—This disease, as already stated, has h
proved fatal within two or three years from implication
oblongata.

Treatment.—We can add nothing to what has be
this head in the preceding article (*q. v.*).

MULTIPLE SPINAL SCLEROSIS.

Synonyms.—Disseminated spinal sclerosis, Insula
sis, Disseminated multilocular sclerosis; (Fr.) Sclér
disséminées; (Ger.) Multiple Sklerose des Rückenmark

Definition.—A spasmodic paraplegia, due to the pr
tered patches of sclerosed tissue in the antero-lateral
spinal cord, but not confined to them.

Ætiology.—But few cases of this disease have been
these throw but little light upon its origin. It appears,
both sexes are about equally affected, and that it is
between the ages of ten and thirty years.

The exciting causes are not positively known, but e
and damp appears to be the chief agent in its productio
bable causes are: traumatic injuries, excessive bodily e
fevers, such as typhus and variola, and, in short, the sa
give rise to the diffuse form.

Morbid Anatomy and Pathology.—Masses of s
varying from one to two lines in thickness, are fou
through different portions of the cord. These islets of s
which have resulted from proliferation and hardening o
with simultaneous wasting of the nerve-elements, are
any particular portion of the cord, though they are m
met with in the lateral columns.

but the cells are increased in size, the nuclei are larger and much more numerous than normal, and the capillaries are thickened from the same cause. The pressure thus exerted upon the nerve-cells and tubes leads to their disintegration and wasting, the fluid portions undergoing fatty degeneration.

Symptoms.—The symptoms of multiple spinal sclerosis are at first of a very uncertain character. Sometimes the patient complains only of weakness in one of his lower limbs; or he may experience various disturbances of sensibility, such as numbness, formication, prickling, etc., symptoms which may exist either singly or combined. After a time, as additional centres of morbid action are established, the symptoms become more pronounced, and finally the upper extremities are similarly affected.

In the meantime, although the paralysis continues slowly to advance, the general health is not apt to suffer, nor are there, as a general rule, any very marked disturbances of sensibility.

At last, however, violent tonic convulsions occur in the paralyzed limbs. The spasms, which are generally confined to the lower extremities, are very easily excited, cutaneous irritation, and even mental emotions, being sufficient in some instances to produce them.

The paralyzed limbs are also affected at this stage with rigidity or contraction, and sometimes with both, some of the joints being contracted, while others are rigidly extended. These conditions, which are of a permanent nature, may precede, accompany, or follow the appearance of the spasmodic movements, but they are not present in every case.

These symptoms continue gradually to increase until, after a period varying from three or four to twenty, or more, years, the paralysis, rigidity, and contraction become so great as to render the patient helpless; and although the bladder and rectum are not affected, he becomes more and more debilitated, bed-sores form over the sacrum and other neighboring parts, and the patient eventually dies, either of decubitus or of some intercurrent disease.

While such is the ordinary type of the disease, the order, and even the character, of the symptoms is far from being invariable. Thus, the upper, instead of the lower, extremities may be the first attacked; anæsthesia or hyperæsthesia may be among the more prominent symptoms; and even the electric-like pains of locomotor ataxia may make their appearance, in consequence of the posterior root-zones becoming involved in the lesion. In fact, the nature of the disease is such that the symptoms must necessarily vary considerably in different cases, since the lesion may implicate any portion or element of the cord. The rhythmical tremor, however, which occasionally makes its appearance near the close, is not a symptom of spinal sclerosis in any form. When present, it shows that the pons Varolii or superior ganglia of the brain are implicated,* or, in other the disease is *cerebro-spinal*—a form which is, perhaps, more met with in practice than either the purely cerebral or spinal types.

Diagnosis.—When the disease is confined to the later of the cord, there is nothing to distinguish it from the sy form of sclerosis already described, and when the posterio are implicated the symptoms are similar to those of locomo consequently, it is impossible, in the present state of our to diagnose the disease with absolute certainty, unless the of these various conditions should happen to be all united i case.

Prognosis.—Although the disease is not directly fatal to the existence of numerous morbid centres, the prospec more unfavorable than that of any other form of spin The disease, though slow in its progress, is decidedly prog so undermines the constitution that the patient is ultima off by bronchitis, pneumonia, dysentery, or some other affection.

Treatment.—As both the nature and symptoms of are similar to those of *spasmodic spinal paralysis* (primary lateral sclerosis), and *locomotor ataxy*, the treatment doe from that given under those heads (*q. v.*).

LOCOMOTOR ATAXY.

Synonyms.—Posterior spinal sclerosis, Sclerosis of th Burdach, Tabes dorsalis, Progressive locomotor ataxia; locomotrice; (Ger.) Graue Degeneration der Hintersträng enmarks.

Definition.—A disease of the posterior root-zones o cord, characterized by loss of power of coördinating whereby voluntary movements, and especially those c walking, are rendered more or less unsteady.

History.—The first full and satisfactory account of which prior to the year 1858 was called *tabes dorsalis*, in c several other affections of a somewhat similar nature, w Duchenne, of Boulogne, who, thinking he had discovere new disease, called it "progressive locomotor ataxia," t which it has since been generally known. Charcot, Pierre have also contributed largely to our knowledge of the now the disease may be said to rank among the best kno interesting affections of the spinal cord.

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* Hammond, op. cit., p. 640.

Ætiology.—Locomotor ataxy is principally confined to the male sex, and occurs for the most part between the ages of twenty-five and fifty years. Syphilis, however, is regarded by many as the chief predisposing cause, probably because the disease is very common among the soldiery, who, as a class, are well-known to be addicted to excess in venery. It should be remembered, however, that soldiers are, as a body, more exposed than others to wet and cold, intemperance, great fatigue, the excessive use of tobacco, and other depressing nervous influences, all of which are among the most common exciting causes of the disease.

Morbid Anatomy and Pathology.—The characteristic anatomical change met with in locomotor ataxy, is sclerosis of the posterior columns of the cord, or rather, of the columns of Burdach, since the columns of Goll are affected only after those of Burdach have become seriously diseased. This condition of sclerosis usually begins in the lumbar enlargement, and gradually extends upward in the columns of Burdach toward the medulla oblongata, until eventually the entire length of the cord becomes implicated.

The morbid alteration consists mainly of atrophy and degeneration of the nerve fibres and roots, with hypertrophy of the neuroglia or connective tissue. According to Dr. Clarke,* the change travels from the centre to the periphery—*i. e.*, from the cord to the posterior roots—and it sometimes ascends as far as the corpora geniculata, but seldom as far as the corpora quadrigemina.

Symptoms.—In most cases the disease is preceded by certain premonitory symptoms, such as amblyopia, double vision, strabismus, ptosis, and other ocular disturbances, deafness, anæsthesia of the face, loss of taste, dysphagia, and neuralgic and rheumatic pains in different parts of the body. Pains of an electric-like character are of frequent occurrence during the first or prodromic stage, and are regarded by Trousseau as almost pathognomonic of this period of the disease. Such pains, however, can scarcely be considered pathognomonic, since, according to Lasigue, they are a common prodromal manifestation of other spinal diseases, especially general paralysis.

The second or full-formed stage is characterized by muscular incoördination, which generally begins in the lower extremities and, after a certain but variable time, involves also the upper extremities, particularly the hands and arms. It first affects the gait, rendering it unsteady like that of an intoxicated person. After a time the difficulty of walking becomes so great as to require the aid of vision to prevent the patient from falling. Even with his eyes fixed upon his feet he may find it difficult to preserve his equilibrium—a difficulty which he tries to overcome by placing his feet widely apart, as when a child is learning to walk. Locomotion is rendered still more difficult by the loss of sensibility in the feet, the sensation being that of standing on cushions. When the upper extremities become affected the patient finds more or less difficulty in dressing, writing, or performing any action requiring the use of his hands.

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* Quain's Dict. of Med., p. 852.

As the disease progresses, the voluntary movements become hurried and precipitate, as in chorea. This arises from an inability to regulate the degree of muscular contraction required in deliberate movement, the muscles, when put in motion, flexing and extending the limbs beyond the point intended, and with a sort of jerk.

The symptoms which usually accompany the ataxy embrace not only those already mentioned, but also spermatorrhœa, loss of virile power, dysuria, incontinence of urine, diminished electro-muscular contractility, abolition of the patellar tendon reflex, gastric and cardiac disturbances, together with shifting pains of a neuralgic and rheumatic character.

The pains of locomotor ataxy are peculiar. One kind, the neuralgic, is of a sharp, lancinating character, like electric shocks. They occur in paroxysms, coming and going irregularly during the course of the disease. The other kind of pain is of an aching, gnawing character, like that of rheumatism, for which it is frequently mistaken.

The above symptoms are not all present in every case, nor do they occur in any invariable order. As above stated, however, the ocular disturbances are generally the first to make their appearance; but in many cases the pains precede all other symptoms. Hyperæsthesia of the cutaneous surface is not an unusual symptom at the outset, but it soon gives place to anæsthesia. Analgesia, or loss of sensibility to pain, is common in the later stages, often reaching such a degree that neither pinching nor pricking can be felt.

The last stage is characterized by loss of muscular power. The paralysis involves not only the limbs, but extends to the bladder and rectum, producing incontinence of urine and fæces. Occasionally, the joints become affected by an œdematous swelling, which appears suddenly, and is often limited to the knee-joint. At last amaurotic blindness sets in; nutrition fails; and decubitus, blood-poisoning, or tuberculosis, generally carries off the patient.

Diagnosis.—The diagnosis of locomotor ataxy in its early stage is sometimes a very difficult matter, especially if only two or three of the premonitory symptoms are present. Moreover, several of these symptoms, such as strabismus, amblyopia, anæsthesia, and the so-called rheumatic pains, are common to other disorders. We may, however, be able to find some peculiarity about them which will assist in the diagnosis; as, for example, the strabismus, if single, may be accompanied by amblyopia on the same side. The pains, also, are generally more erratic and peculiar than they are in other diseases.

Prognosis.—The prognosis is generally unfavorable, especially if the disease has already gained considerable headway. Although frequently extending over many months, or even years, Romberg predicts a fatal result in every case. On the other hand, Remak and others claim to cure most of their cases. This discrepancy appears to be owing to the fact that the disease is not always progressive, or, if progressive, it is not steadily so, some cases standing in abeyance, or undergoing amelioration, while others progress uninterruptedly to a fatal termination. *Cæteris paribus*, the earlier the disease is brought under treatment, the more promising the result.

Treatment.—Special Indications.—Aluminium met.—Inability to walk, except in the daytime and with the eyes open; heaviness of the limbs, he can hardly lift them; slow, staggering gait, as after a long sickness; soles of the feet feel as though they were swollen and too soft; numbness of the heels when stepping on them; pain in the back as if bruised, or as if a hot iron were thrust through the lower vertebræ; when his eyes are closed, his whole body totters, and if not firmly held he falls down.

Argentum nit.—Cannot walk in the dark without staggering: weakness and paralytic feeling in the limbs, especially the lower: numbness and want of feeling in the extremities; trembling and convulsive movements; drawing and jerking in the legs and arms.

We can testify to having treated a case of locomotor ataxia successfully with this remedy after the symptoms of incoördination had set in. The patient was a man about thirty-six years of age, who was also suffering from constitutional syphilis. We kept him on the 1st dec. trit. of *Kali iod.* for nearly three months, after which we prescribed *Argentum nit.*, 3d x, every night and morning, which was continued with brief interruptions for more than a year. Nearly five years have since passed, and there has been no relapse.

Belladonna.—Loss of coördination of movement in both upper and lower limbs; when walking, he raises his feet slowly and puts them down with force; trembling of the muscles and limbs; weak and tottering gait; great restlessness, with sudden startings.

Helleborus.—Muscles do not act in harmony unless the attention is fixed upon the movement; walk slow and tottering; weakness and numbness of the feet, with prickling sensation in the toes; remarkable unsteadiness of action; all the muscles of the limbs feel heavy and painful.

Gelsemium.—Paralysis of all the limbs, cannot move them, they feel so heavy; sharp, darting pains, like electric shocks, through the limbs; muscles feel sore and bruised; tingling, prickling sensation in the limbs, as though they were asleep.

Nux vomica.—Numbness and paralysis in the lower limbs; heaviness and weariness in them, with unsteadiness of gait; tottering and giving way of the knees, with extreme weakness; twitching and jerking in the muscles; paralysis of the bladder; obstinate constipation.

Phosphorus.—Heavy, paralytic feeling in the limbs, with trembling of the knees; paralytic feeling in the feet; great restlessness of the limbs; pains darting from the hip-joint; sexual irritation; involuntary seminal emissions; great irritability and nervousness; bad effects of onanism.

Physostigma.—Feeling of unsteadiness and insecurity in walking; has to tread carefully, especially if the eyes are shut or when in the dark; feels the need of a cane or some other means of support.

Picric acid.—Universal prostration, mental as well as physical; tired feeling in all the limbs; in walking he shuffles his feet over the surface of the ground, as if he had no power to raise them; sensation of "pins and needles" in the legs and feet; increased sexual desire, with erections and emissions; general letting down of the whole system.

Rhus tox.—Staggering gait from loss of coördination; heaviness and weariness of the limbs, especially the lower; paralysis of the lower limbs, with dragging, slow, difficult walk; great languor, with constant disposition to sit or lie down; symptoms aggravated by rest, or return after rising.

Secale corn.—Trembling of the limbs; difficult, staggering gait; formication and pains in the lower extremities; spasmodic movements, sometimes attended with violent pains; inability to walk, not for want of power, but because he is unable to govern his movements.

Zincum.—Weak, lame feeling in the back and limbs; trembling of the limbs, with constant feeling of weakness and fatigue; lancinating pains extending to the knees, which feel as if they would give way.

Consult also: *Acid. picrotox.*, *Æsculus hip.*, *Angustura*, *Arsenicum*, *Calcarea carb.*, *Causticum*, *Cocculus*, *Conium*, *Cuprum acet.*, *Graphites*, *Lachesis*, *Natrum*, *Natrum mur.*, *Nux mosch.*, *Phosphoric acid*, *Pinus sylv.*, *Plumbum*, *Silicea*, *Stramonium*, *Sulphur*, *Tarentula*, *Zincum phos.*

Auxiliary Treatment.—*Nerve-Stretching.*—Until very recently, this new operation has been regarded as one of the most important auxiliary measures which could be adopted for the amelioration of the symptoms of this disease, especially of the pains, as in a number of cases sensibility, ataxia, and difficulties of the bladder and rectum seemed to improve; but in others unfavorable results appeared, such as anæsthesia and paresis. Thus, out of forty-nine cases of locomotor ataxy which were subjected to this treatment, according to Dr. Chandler,* no less than thirty-two per cent. were very much improved. On the other hand, in the great discussion on this subject in the *Berlin Med. Society*, in which Langenbeck, Westphal, Remak, and others of those most conversant with the subject, took part, the general tenor of the discussion, as summed up by Professor Westphal, was, that no case of locomotor ataxy had ever been actually cured by this means, and that it is doubtful whether any marked symptoms have been permanently relieved by it.† Moreover, the operation, as performed for this disease, is far from being unattended with danger, no less than five fatal cases having already been recorded. Notwithstanding this, however, Dr. Althaus thinks it will keep a prominent place in the therapeutics of this disease, since in numerous well-observed cases the improvement has been most marked and satisfactory, not only in the sphere of the stretched nerve, but far beyond its territory.‡

Electricity.—This agent, which in the form of the constant galvanic current has sometimes proved very beneficial, may be applied every twenty-four hours to the spine, by placing the anode, or positive pole, at the nape of the neck, and sweeping the cathode, or negative pole, up and down the vertebral column.

Lukewarm Baths.—Karl Pauli highly recommends these baths, first introduced by Westphal, as being the best means of relieving the lancinating pains, employing them almost constantly for three or four weeks, or until relief is obtained. So great is the feeling of relief in most cases that patients who have begun to take them express themselves, he says, as absolutely requiring their repetition. He adds: "As for internal medication, nothing as yet has been found to exert more beneficial results (in controlling the lancinating pains) than *Zinc phosphide*, two to four granules of which, each containing four milligrams, are to be given each day."

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* Med. News, Phila., June 10, 1882, p. 644.

† Berlin. Klin. Woch.

‡ Brit. Med. Jour., Jan. 7, 1882.

SECONDARY SPINAL DEGENERATION.

Synonyms.—Secondary degeneration of the spinal cord; (Fr.) Les Dégénérations secondaires de la Moëlle Épinière; (Ger.) Secondäre Erkrankung einzelner Rückenmarkstränge.

Definitions.—Secondary spinal degenerations are lesions which occur in certain regions of the spinal cord, either as a result of some previous disease of the cord itself, or as a consequence of brain-disease.

History, etc.—About twenty-five years ago, the English physiologist, Waller, discovered that when a nerve is divided transversely, so as to separate it from its ganglionic centre, the peripheric end always degenerates throughout its entire length; and this is true even of the mixed nerves, the degeneration taking place in both the centripetal and the centrifugal fibres which compose it. The life of the nerve, therefore, that is to say, its trophic centre, is in the direction of the spinal axis. When, however, the section is made upon the anterior and posterior roots separately, it is found that in the former case the peripheric end, and in the latter the central part—that is, the part connected with the cord—degenerates, showing that the degeneration takes place in the *direction of its functional activity;* and this law is found to be true of all lesions followed by secondary degenerations, whether cerebral, spinal, or peripheral. Applying this principle to the spinal cord, we find that whatever interrupts the passage of the normal excitations through its columns causes the degeneration of the latter, agreeably to the well-known law that the disuse of any organ or part leads to its atrophy and degeneration.

M. Charcot* sums up the various secondary spinal degenerations as follows: "The fibres of the fasciculi, which degenerate downwards below the point of lesion are, 1st, the *pyramidal fasciculi* composed of fibres, the trophic centres of which should be in the pyramidal cells of the gray cortex of the region of Rolando; 2d, the *short fibres of the lateral fasciculi*, the fibres of origin which overlap each other from above downwards in the diverse points of the spinal gray centre. The fasciculi which degenerate upwards are, 1st, the *direct cerebellar fasciculi*, whose trophic centre is in the cord itself, while the terminal centre is in the cerebellum; 2d, the *fasciculi of Goll*, whose trophic centres occupy the gray substance of the inferior regions of the cord, and whose centres of termination are in the gray substance of the bulbar region; 3d, and finally, the short commissural fibres of the *fasciculi of Burdach*, which equally degenerate from below upwards."

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* Progrès Médical, 1880.

Ætiology.—Secondary degeneration of the spinal cord may result from lesions originating in the central region of the cerebral cortex, in the nuclei of the corpora striata, in the internal capsule, in the cerebral peduncles, in the pons Varolii, in the medulla oblongata, in the spinal cord itself, and in the posterior roots of the spinal nerves. The chief proximate cause of spinal degeneration is the impairment of nutrition resulting from anæmia and the arrest of nervous influence.

Morbid Anatomy and Pathology.—The degenerative changes in this disease are generally confined to the white substance of the cord, and are similar to those which have already been pointed out as belonging to the several forms of sclerosis, namely, atrophy and degeneration of nervous filaments, the formation of granular corpuscles in the degenerated tissue, and the proliferation of the neuroglia or connective tissue. When muscular atrophy is associated with the paralysis and contracture, the anterior horns of gray matter are involved in the degenerative process, the nerve-cells undergoing more or less disintegration and wasting.

Symptoms.—In almost every case of hemiplegia of several months' duration, there is found to be more or less atrophy associated with rigidity and contraction. MM. Bouchard and Charcot have shown that these contractions are the result of secondary degenerations taking place in the spinal cord. This late rigidity and contracture is of a permanent character, and much more common in the upper than in the lower extremity. Thus, we frequently find the paralyzed arm drawn firmly across the front of the chest, the hand flexed upon the forearm, the fingers buried in the palm of the hand, the muscles atrophied, and the whole limb in a state of constant rigidity.

In these cases there is generally a notable diminution in the electric irritability of the paralyzed muscles. Sometimes, however, the electric contractility of some of the muscular fibres is exalted, while that of others is diminished, so that when the electric stimulus is applied, the muscles swell up into numerous hard knots.

Although rigidity with contraction is much more common in the upper than in the lower extremity, it sometimes occurs in the muscles of the lower limb, while those of the upper remain unaffected.

Charcot has found that these symptoms do not generally show themselves in a decisive manner until about the second or third month of the hemiplegic seizure.

Cerebral lesions are not the only ones which are capable of producing permanent muscular contractions. The cord itself may be the seat of primary disease, the lateral columns becoming the seat of secondary degeneration, and the muscles undergoing permanent contraction. Not only primary sclerosis, but tumors and other lesions of the cord may give rise to secondary spinal degeneration and its consequences.

Diagnosis.—M. Charcot* affirms that the period of late contracture in incurable hemiplegia is preceded by a prodromic period during which certain phenomena are observed which, if they do not establish the certainty of a secondary degeneration, at least render its presence very probable. One of these phenomena, called the *foot phenomenon*, is produced on a patient by lifting the paralyzed lower limb and placing the left hand on the ham in such a way that the leg swings free, and then roughly raising the point of the foot with the other hand. When this is done there immediately occurs a series of agitations of a trembling, oscillatory character, more or less regular and persistent. Now, not a trace of this spinal trepidation exists in the normal state, although it is one of the characters of the group of spasmodic paralyses, but when late contraction exists it is nearly constant.

Another diagnostic symptom in these cases is the "tendon reflex" or *knee phenomenon*. In hemiplegias menaced with contracture it precedes, even quite often, the appearance of the foot phenomenon.

Another class of phenomena observed in these cases is what is known as *associated movements*. In 1872, Onimus noticed that when the arm is completely paralyzed, so that no voluntary movement is possible in it, the shutting of the hand on the non-paralyzed side, or the individual movement of either of the fingers, excited similar movements in the hand or fingers of the paralyzed side—movements which are entirely involuntary; and, generally speaking, it is only by a great effort of the will that patients can prevent their production.

Prognosis.—It is claimed by Bouchard, Hammond, and others, that the nerve-fibres may be regenerated, like those of the peripheral nerves, and consequently that the disease is susceptible of cure, even in severe cases.

Treatment.—Dr. Hammond, who claims to have succeeded several times in effecting the complete relaxation of the contracted muscles, and the entire restoration of sensibility and the power of motion to the paralyzed limbs, says he has obtained the best results from the use of the primary galvanic current to the cord, the same or the induced current to the muscles, forcible extension and flexion of the contracted limbs, and the internal administration of *Argentum nit.* and *Baryta chlor.* He also says that the opposing muscles, which are more or less paralyzed, are generally greatly benefited by stimulating them with the galvanic current.

I have myself met with very good success in one case of secondary spinal degeneration by the faithful use of these measures, the rigidity and contraction being apparently permanently overcome; but I have been able to effect but very little, if any, improvement by these or any other means in another case in which there was a marked degree of muscular atrophy, coupled with a low state of the general health; and I am inclined to think that this will prove to be the case in the great majority of such instances.

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* Op. cit.

For additional remedies and special indications see *Cerebral Hæmorrhage* and the various forms of *cerebral* and *spinal sclerosis, atrophy,* and *paralysis.*

FOREIGN GROWTHS AND PARASITES.

Synonyms.—Meningeal and intra-medullary spinal tumors; (Fr.) Tumeurs rachidiennes, Tumeurs de la moëlle épinière; (Ger.) Krankhafte Geschwülste des Rückenmarks.

Definition.—Foreign growths, tumors, and adventitious products within the spinal canal.

Ætiology.—The ætiology of spinal tumors is often very obscure; in short, little is known of their origin beyond the simple fact that, as a general rule, they result either from some diathesis or constitutional dyscrasia, or from wounds and injuries, the former constituting in most cases the predisposing, and the latter the exciting cause. Parasitic tumors owe their origin, of course, to the presence of certain parasites, such as cysticerci and hydatids, but how the latter gain entry into the system, and especially what influences, if any, determine their appearance in the spinal tissues or organs, are questions which seldom admit of a satisfactory answer.

Morbid Anatomy and Pathology.—*Syphilitic neoplasmata,* though much less common in the spinal cord and membranes than in the brain, present the same two varieties, namely, the soft or jelly-like, and the hard or cheese-like, forms of syphilomata. They do not generally appear as well-defined tumors, but as small, multiple patches disseminated through the tissues, uniting the membranes with each other and with the cord.

Scrofulous growths appear either as caseous deposits on the inner surface of the dura mater, or infiltrated through it in connection with scrofulous caries of the vertebræ; or else as small isolated "tubercular" tumors springing from the spinal pia mater, and frequently imbedding themselves in the substance of the cord. Though most commonly associated with tubercular meningitis, the latter may exist independently in the substance of the cord, in which case they are frequently combined with a certain amount of secondary spinal softening.

Cancerous growths originate either from the vertebræ or the dura mater; they are thought never to occur as a primary affection of the cord.

Sarcomatous tumors are met with both in the meninges and in the spinal cord. In the former case they are generally connected with the soft membranes, though they sometimes spring from the dura mater. They are not always distinctly circumscribed, but occasionally invade the pia mater, in the form of diffuse infiltrations, to a considerable extent.

Gliomatous tumors are of the nature of *sclerosis*, being, according to Virchow, and other pathologists, hypertrophic developments of the neuroglia or connective-tissue elements of certain portions of the cord. They are often very vascular, subject to more or less central softening, and frequently excite secondary softening in the surrounding tissue of the cord.

Myxomata, *fibromata*, *lipomata*, and other rare forms of spinal tumors, are occasionally met with, either in a circumscribed or infiltrated form, but chiefly in connection with the dura mater.

Parasitic growths, consisting either of the small and more or less numerous *cysticerci*, or the more solitary and larger *hydatids*, are found in connection with the spinal meninges, especially the dura mater. They occur both within and without the dura mater, but most frequently in the latter situation, sometimes forming tumors of considerable size just within the vertebral canal.

Symptoms.—The symptoms of intra-vertebral tumors are often of a very vague and uncertain character. This is especially the case during the early stages or when the tumors are small, though, of course, much depends on whether or not they directly implicate the anterior or posterior roots on one or both sides of the cord. In the latter case, especially, pains and anæsthesia, with or without muscular twitchings, contractions of the limbs, and paralytic symptoms, will show themselves in various parts of the body, according as the lesion is situated in the upper, middle, or lower portion of the spine. *Hemiparaplegia* is not an uncommon symptom, due to compression of one lateral half of the cord.

Diagnosis.—The diagnosis of spinal tumors is beset with difficulties, since precisely the same symptoms may arise from very different causes. Almost every case, however, is attended with one or more of the following peculiarities: first, a very gradual onset of the symptoms; second, marked exacerbations and remissions corresponding to changes in the size and vascularity of the tumor; third, peculiarities arising from the seat and circumscribed character of the lesion; and fourth, the presence or absence of any other disease of the cord, the membranes, or the vertebræ, capable of producing the symptoms.

As to the nature of the foreign growth, it can at best be only conjectural. Where there is well-marked dyscrasia, the presumption will be in favor of its being either scrofulous, syphilitic, or cancerous, according as one or the other of these diatheses prevails. The presence of tumors elsewhere may also throw some light upon the subject.

Prognosis.—The prognosis is always bad. Nothing but a possible mistake in diagnosis can offer any well-grounded hope of ultimate recovery. Life may indeed be greatly prolonged, and symptoms may from time to time be greatly ameliorated, but the general tendency is from bad to worse, in consequence, chiefly, of the setting in of secondary results, in the form either of spinal softening or of hæmorrhage. These accidents not only greatly aggravate the symptoms at the period of their occurrence, but, in a variety of ways, lead ultimately to a fatal termination.

Treatment.—The most promising cases for treatment are the syphilitic. It is not sufficient, however, in these cases, that anti-syphilitic remedies simply, such as *Mercurius* and *Kali iod.*, should be given, but the vital power should be raised, the nutritive functions improved, and the patient placed under the most favorable hygienic conditions. This is also true of the other cachexia. In addition, therefore, to the usual anti-syphilitic, anti-scrofulous, anti-cachectic, and anti-paralytic remedies, such medicines should be administered as the entire group of symptoms, both constitutional and local, may call for; in other words, the case should be carefully individualized. It is true, even this treatment will only prove palliative; but it will, in most cases, greatly add to the life and comfort of the patient.

Consult, *for syphilomata*, Arsenicum, Causticum, Conium, Ferrum iod., Hepar sulph., Kali iod., Lachesis, Mercurius, Natrum mur., Phosphorus, Silicea, Sulphur.

For scrofulosis, Calcarea, Cistus, Graphites, Hepar sulph., Iodum, Lycopodium, Mercurius, Phytolacca, Rhus, Rumex, Stillingia, Theridion, Thuja.

For cancerous tumors, Arsenicum, Conium, Phytolacca, Clematis, Lycopodium, Nitric acid, Cistus, Kaolin, Lapis alb., Rumex, Sulphur.

See also *Myelitis*, *Spinal Meningitis*, *Spinal Paralysis*, *Paraplegia*, and the various forms of *Spinal Sclerosis*.

CONCUSSION OF THE SPINAL CORD.

Synonyms.—Commotio medullæ spinalis; (Fr.) Commotion de la moelle; (Ger.) Erschütterung des Rückenmarks.

Definition.—A shock or jar communicated to the nervous elements of the spinal cord by a fall, blow, railway collision, or other similar accident, whereby its functions are more or less disturbed, and a loss or modification of innervation is immediately or remotely induced.

Ætiology.—The ætiology is given in the above definition. Both the brain and spinal cord are liable to suffer from shock in these cases, so that the symptoms of concussion are not unfrequently of a cerebro-spinal rather than of an exclusively spinal character.

Morbid Anatomy and Pathology.—Many cases of spinal concussion exhibit no morbid appearances on dissection, even when the shock has proved fatal by the sudden induction of paralysis. In this respect it resembles concussion of the brain. But, as remarked by Erichsen,* it is probable that it might be found, in a fatal spinal concussion, that the nervous substance is widely and profusely studded with disseminated punctiform blood extravasations, as we sometimes see in fatal cerebral concussion. This author, whose investigations in this class of cases are as original as his experience in them is extended, mentions the following four forms of lesions met with in fatal cases of spinal concussion, viz.: (*a*) hæmorrhage within the spinal canal; (*b*) laceration of the membranes of the cord and extrusion of the medullary substance into the spinal canal; (*c*) extravasation into the substance of the cord; (*d*) disintegration and inflammatory softening of the cord. The hæmorrhage he has found to occur (*a*) between the vertebræ and the dura mater; (*b*) between the membranes and the cord; (*c*) in both situations.† Slighter injuries sometimes give rise to small extravasations in the cord, producing immediate paralysis; while in other cases, in which at the time there may be no apparent lesion, irritation or chronic inflammation of the cord and of its membranes may afterwards be developed as a result of the concussion.

Symptoms.—The symptoms vary greatly in different cases, some cases being attended with complete paralysis from the first, though this is not usually the case even in severe injuries. In the majority of instances there is, at most, paresis of one or more limbs, generally the lower, with prostration, nausea, and occasional vomiting. The pulse is usually rapid and somewhat irregular, and the temperature depressed, especially at first; this is generally succeeded by a febrile reaction which may last for several days. More or less impairment of sensation as well as of motion is observed in most cases, together with occasional twitching or jerking of the limbs, darting pains, and a sensation of "pins and needles." There is frequently, also, more or less tenderness on pressure over the spine, disorder of the digestive organs, irritability or weakness of the bladder, general restlessness, sleeplessness, and other evidences of impaired health, quickly following the accident.

When the concussion is more severe, the shock may be so great as to produce complete paraplegia; but if there is no appreciable lesion connected with the injury, the paralysis, after lasting several days, may soon disappear.

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* On Concussion of the Spine, etc., New York, 1883, p. 32.

† Op. cit., p. 33.

Diagnosis.—The diagnosis between simple concussion, unattended by any organic lesion of the cord, and those more serious injuries which immediately lead either to a fatal termination or to the most serious spinal complications, is frequently attended with very great difficulty and doubt. Indeed, it is often impossible to ascertain the nature of the change which has taken place in the cord after a concussion, until sufficient time has elapsed to show whether the symptoms are simply those of shock, or whether they result, in part at least, from lesions which must entail future mischief, if not serious danger to life. The difficulty of forming a correct estimate of the nature and extent of the spinal injury is also greatly enhanced, in many cases, by the disposition of the patient and his friends to exaggerate the symptoms, either in consequence of their excited imagination or from interested motives, the question of pecuniary damage being in many instances an important factor in the diagnosis. Justice, no less than the reputation of the physician, demand the utmost care, discretion, and intelligence on the part of the medical practitioner, in coming to a conclusion in such cases.

Prognosis.—The prognosis, so far as danger to life is concerned, is generally good. Only in the severest cases, or when accompanied with great prostration, an excitable nervous temperament, or a previously diseased state of the heart, is there any immediate danger of a fatal termination. Cases thus complicated, however, may very speedily succumb to a severe concussion of the spine, especially if the patient is old or greatly deficient in vital power. On the other hand, slighter cases, if properly treated, will generally, sooner or later, end in perfect recovery.

But the greatest danger in severe cases generally lies in the sequelæ which sometimes follow, and which may not show themselves for weeks, and even months, after the concussion. These are very numerous, embracing almost every organic disease of the cord, spinal anæmia, meningitis, myelitis, sclerosis, progressive muscular atrophy, paraplegia, caries of the vertebræ, etc., to which may be added marasmus, epileptiform convulsions, various ocular troubles, spinal exhaustion, etc.

Complications.—In many instances fracture of the vertebræ or laceration and extrusion of more or less of the spinal marrow, are evident on inspection. Medical treatment should not, as a rule, be instituted in such cases until the necessary surgical measures are attended to, such as the adjustment of fractures, the removal of depressed bone, and the evacuation of extravasated blood.

Treatment.—Therapeutics.—Arnica.—Concussion, especially when followed by hæmorrhage; limbs cold, pulse slow and weak, and sickness of stomach; paresis, with or without numbness of the affected limbs; worse by moving, better from lying quiet.

Cicuta.—Paralysis with insensibility; convulsive twitchings of the muscles;

constipation; irritability of the bladder; coldness of the body, with an excited and apprehensive state of the mind.

Conium.—Concussions attended by a sensation of numbness in the paralyzed parts; sensation as if the limbs were surrounded by tight bands.

Hypericum.—Great nervous depression following spinal concussion; vertebræ very sensitive to the touch; inability to walk after a fall or injury, especially when attended by violent pains; retention of urine, with desire to urinate and shuddering.

Rhus tox.—Paralysis following spinal injuries, accompanied with extreme coldness of the hands and feet; muscular startings and twitchings; pains and numbness in the affected limbs.

Hepar sulph.—Great weakness of the limbs, with nervous depression; shiverings from below upwards; very irritable and excitable; nervous trembling; weakness of the bladder, with involuntary discharges of urine.

Sulphuric acid.—Weakness in the lower limbs and small of the back, so violent as to prevent standing without support; shooting pains in the limbs, with trembling of the whole body; violent pressure on the neck of the bladder, with retention of urine.

Consult also *Bryonia*, *Pulsatilla*, *Iodum*, *Lachesis*, *Camphor*, *China*, *Cuprum*, *Gelsemium*, *Ipecacuanha*, *Mercurius*, *Phosphorus*, *Secale corn.*, *Strontiana*, *Veratrum alb.*, and *Sulphur*.

Hygienic Treatment.—Perfect rest in the recumbent position should be enjoined for some time after concussion of the spine, and until the reactive fever is allayed. The patient should also be kept free from all excitement, and such other measures adopted as will insure sound sleep. Rest and sleep, with plenty of fresh air, and a simple nutritious diet, will of themselves be sufficient in most cases to restore the patient to health.

Auxiliary Treatment.—Pain may often be relieved by the application of ice and ice-water to the spine. For this purpose Chapman's rubber-bags will be found convenient. Continuous galvanic currents are also useful in hyperæsthetic states of the spinal cord. Cold salt-water douches, or the shower bath, will sometimes prove beneficial in the more advanced stages. If necessary, the temperature of the body, especially of the extremities, should be maintained by artificial means. The patient will often be benefited by a change of air and scene, but exercise must not be permitted until after the nervous system has recovered from its exhausted or enfeebled state.

COMPRESSION OF THE SPINAL CORD.

Synonyms.—Traumatic lesion of the spinal cord; Compressio medullæ spinalis; (Fr.) Compression de la moelle épinière; (Ger.) Compression des Rückenmarks.

Definition.—Compression of the spinal marrow by displacements of the vertebræ, by extravasations and inflammatory exudations within the vertebral canal, and by secondary changes in the cord itself, caused by traumatic lesions either acute or chronic.

Ætiology.—Acute compression of the spinal cord may be caused

Diagnosis.—The diagnosis between simple concussion, unattended by any organic lesion of the cord, and those more serious injuries which immediately lead either to a fatal termination or to the most serious spinal complications, is frequently attended with very great difficulty and doubt. Indeed, it is often impossible to ascertain the nature of the change which has taken place in the cord after a concussion, until sufficient time has elapsed to show whether the symptoms are simply those of shock, or whether they result, in part at least, from lesions which must entail future mischief, if not serious danger to life. The difficulty of forming a correct estimate of the nature and extent of the spinal injury is also greatly enhanced, in many cases, by the disposition of the patient and his friends to exaggerate the symptoms, either in consequence of their excited imagination or from interested motives, the question of pecuniary damage being in many instances an important factor in the diagnosis. Justice, no less than the reputation of the physician, demand the utmost care, discretion, and intelligence on the part of the medical practitioner, in coming to a conclusion in such cases.

Prognosis.—The prognosis, so far as danger to life is concerned, is generally good. Only in the severest cases, or when accompanied with great prostration, an excitable nervous temperament, or a previously diseased state of the heart, is there any immediate danger of a fatal termination. Cases thus complicated, however, may very speedily succumb to a severe concussion of the spine, especially if the patient is old or greatly deficient in vital power. On the other hand, slighter cases, if properly treated, will generally, sooner or later, end in perfect recovery.

But the greatest danger in severe cases generally lies in the sequelæ which sometimes follow, and which may not show themselves for weeks, and even months, after the concussion. These are very numerous, embracing almost every organic disease of the cord, spinal anæmia, meningitis, myelitis, sclerosis, progressive muscular atrophy, paraplegia, caries of the vertebræ, etc., to which may be added marasmus, epileptiform convulsions, various ocular troubles, spinal exhaustion, etc.

Complications.—In many instances fracture of the vertebræ or laceration and extrusion of more or less of the spinal marrow, are evident on inspection. Medical treatment should not, as a rule, be instituted in such cases until the necessary surgical measures are attended to, such as the adjustment of fractures, the removal of depressed bone, and the evacuation of extravasated blood.

Treatment.—Therapeutics.—Arnica.—Concussion, especially when followed by hæmorrhage; limbs cold, pulse slow and weak, and sickness of stomach; paresis, with or without numbness of the affected limbs; worse by moving, better from lying quiet.

Cicuta.—Paralysis with insensibility; convulsive twitchings of the muscles;

constipation; irritability of the bladder; coldness of the body, with an excited and apprehensive state of the mind.

Conium.—Concussions attended by a sensation of numbness in the paralyzed parts; sensation as if the limbs were surrounded by tight bands.

Hypericum.—Great nervous depression following spinal concussion; vertebræ very sensitive to the touch; inability to walk after a fall or injury, especially when attended by violent pains; retention of urine, with desire to urinate and shuddering.

Rhus tox.—Paralysis following spinal injuries, accompanied with extreme coldness of the hands and feet; muscular startings and twitchings; pains and numbness in the affected limbs.

Hepar sulph.—Great weakness of the limbs, with nervous depression; shiverings from below upwards; very irritable and excitable; nervous trembling; weakness of the bladder, with involuntary discharges of urine.

Sulphuric acid.—Weakness in the lower limbs and small of the back, so violent as to prevent standing without support; shooting pains in the limbs, with trembling of the whole body; violent pressure on the neck of the bladder, with retention of urine.

Consult also *Bryonia*, *Pulsatilla*, *Iodum*, *Lachesis*, *Camphor*, *China*, *Cuprum*, *Gelsemium*, *Ipecacuanha*, *Mercurius*, *Phosphorus*, *Secale corn.*, *Strontiana*, *Veratrum alb.*, and *Sulphur*.

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Ætiology.—Acute compression of the spinal cord may be caused by wounds inflicted with a knife, dagger, sword, hatchet, other penetrating weapon or missile; or it may result from forms of external violence, such as falls, blows, railway a accidents which not only produce fractures and dislocatio vertebræ, but give rise to sudden crushing lesions of the co by rupturing or perforating the spinal meninges, cause m hæmorrhage into and between the membranes, and also int stance of the cord. Slow or chronic compression of the cord caused by diseases of the vertebræ, especially scrofulous or caries, which throws out a tough, yellowish growth which the dura mater, and presses injuriously upon the cord. It be produced by exostoses projecting into the spinal canal, and other tumors, and by certain forms of local softeni "compression myelitis."

Morbid Anatomy and Pathology.—In acute cases, anatomical changes, aside from the traumatic lesion, are, at or less effusion of blood from the cut surfaces of the cord a quently, more or less inflammation of the contiguous m and, it may be, some local inflammatory softening of the co the lesion is of a sudden, crushing character, the membran only be extensively lacerated, but the cord may be so viol pressed at the seat of injury as to be converted into a pulpy mass. If the patient survive the immediate eff injury, inflammatory changes will take place in the mem in the adjacent portions of the cord, which will lead to m inflammatory softening. In chronic cases the pathologic vary according to the nature of the cause producing the co Thus, scrofulous caries of the bodies of the vertebræ gives r or less softening of the cord opposite the point of compres softening may, or may not, be followed by secondary de In other cases, such, for example, as result from exostosi compression causes an atrophy of the nerve elements and the neuroglia or connective-tissue elements of the cord.

Symptoms.—Acute traumatic lesions, such as result tured or gun-shot wounds, often give rise to unilateral para in the form of *hemiparaplegia* or of *hemiplegia spinalis.* from the fact that the wound frequently involves only a po transverse diameter of the cord. If this occurs in the do only one leg will be paralyzed, and we shall have what i *hemiparaplegia;* but if it exists in the upper part of the cer both arm and leg will be paralyzed, and we shall have th known as *hemiplegia spinalis.* In these cases, there is *co thesia* on the side *opposite* the motor paralysis (*hemianæ vaso-motor paralysis* on the *same* side as the motor par latter usually gives rise to an elevation of temperature v

1½° to 2° F., and an increase of sensibility, due chiefly to hyperæmia in the limb and cord. A narrow band of hyperæsthesia generally surrounds the body on a level with the upper border of the hemianæsthesia. The latter—*i. e.*, the half-zone of anæsthesia—varies in depth with the longitudinal extent of the spinal lesion, and hence is probably due to the destruction of that portion of the cord, while the zone of hyperæsthesia is probably due to hyperæmia of the gray matter of the cord immediately above the lesion.

When the lesions are of a crushing character, there is generally complete paralysis, both of motion and of sensation, in all parts of the body below the seat of injury. Hence there is complete paralysis of the bladder and bowels, with retention of urine and fæces, followed after a time by incontinence. Reflex action is also abolished in the paralyzed parts, but their temperature is usually increased, owing to vaso-motor paralysis. If the patient survive the injury two or three days, he will, in addition to suffering a continuance of the previously existing pains in the back, and of those immediately above the limit of paralysis, experience also more or less fever, pains and twitchings in the limbs, or in particular muscles, exaltation of the "girdle sensation," and a general increase of reflex action, owing to the setting in of a local meningitis and myelitis, the symptoms of which will differ according to the particular portion of the cord affected.

The symptoms arising from slow compression of the cord are usually due to vertebral caries or to the growth of spinal tumors—subjects which have been fully considered in other articles, and to which the reader is referred. See *Caries of the Vertebral Column* and *Foreign Growths and Parasites*.

Diagnosis.—The diagnosis can only be determined by a careful consideration of all the circumstances and symptoms belonging to the case.

Prognosis.—The prognosis differs somewhat in different cases, but is generally bad, whether the injury be acute or chronic. Other things being equal, the higher the wound is situated, the greater is the danger to life, and the more extensive is the paralysis. Much, however, depends upon the character of the wound. Punctured and gun-shot wounds are usually less serious than crushing lesions of the cord, in consequence, chiefly, of being less extensive in a transverse direction. In either case death may ensue immediately or within a few days, according to the severity of the lesion. On the other hand, life is occasionally prolonged for weeks or months, even in very severe cases, especially when the wound happens to be in the dorsal or lumbar region. In the great majority of cases, however, death is only a matter of time, the patient ultimately falling a victim to exhaustion from spinal meningitis, bed-sores, and cystitis, with perhaps blood-poisoning or some other complication. Chronic cases are, as a rule, more hopeful, especially those depending on vertebral caries, but even in these cases the prognosis is, to say the least, extremely uncertain.

Treatment.—It is unnecessary to lay down any special treatment here, as all that is required will be found under the heads of *Spinal Hæmorrhage*, *Concussion*, *Meningitis*, *Myelitis*, *Softening*, *Vertebral Caries*, and the various forms of *Paralysis* (*q. v.*).

CARIES OF THE VERTEBRAL COLUMN.*

Synonyms.—Pott's disease of the spine, Vertebral caries; Spondylarthrocace; (Fr.) Mal vertébral de Pott, Maladie de Pott; (Ger.) Pott'sche Krankheit.

Definition.—An inflammatory disease of the bodies of the vertebræ, attended with ulceration, softening, and suppuration, gradually destroying the bony tissues, then the cartilaginous tissues; it is generally confined to the anterior part of the spinal column, which subsequently becomes bent upon itself, producing the distortion known as Pott's curvature of the spine.

Ætiology.—The disease may be either of *constitutional* or of *local origin*, or of *both combined.* It is frequently met with in children of a scrofulous or tubercular constitution, and also in cases following attacks of scarlet fever, measles, diphtheria, etc., which have developed considerable constitutional debility. Such cases may occur independently of any history of a local injury, though not unfrequently a fall, blow, or, what is more common, a series of *jumps*, appears to be the exciting cause.

But the most frequent cause in adult life is *direct violence*, such as a fall from a house or ladder, the fall of stones, or the caving in of the earth upon men at work in a stooping position, etc. The same thing occasionally occurs in children of a robust constitution, in whom no hereditary or constitutional weakness has ever manifested itself; this, however, is a rare occurrence during childhood, very few cases being met with at that age which do not exhibit the strumous diathesis.

Again, many cases are due to some form of *indirect violence*, such as sudden jerks or twists of the spine, received in wrestling; jumping from a considerable height and alighting upon the feet; turning summersaults, etc. Such cases generally develop very gradually, and are most likely to occur in persons of a scrofulous or tubercular constitution, especially in the case of children.

Morbid Anatomy and Pathology.—The disease, as met with in strumous subjects, consists essentially in a scrofulous or tubercular infiltration of the bodies of the vertebræ, followed, as generally happens in this morbid condition, by congestion, inflammation, ulceration, softening, and suppuration of the affected tissues, in consequence of which the vertebral bodies become thinned, and gradually hollowed out anteriorly, leaving, as a general rule, the spines, arches, and the tubercles unaffected. This destructive process may continue until the bodies of from three to six, or more, of the vertebræ are destroyed, together with the intervening intervertebral fibro-cartilages, which undergo simultaneous disorganization. These changes always produce an angular backward projection or curvature of the diseased portion of the spine, the mechanism of which is obvious. The bodies of the vertebræ being thinned and weakened by caries and necrosis of the osseous tissue, finally yield to the pressure of the weight of the body above, causing the latter to bend over anteriorly, and the affected portion of the spine to project posteriorly. This projection is most manifest in the dorsal region, partly in consequence of the mid-dorsal region being the part usually most extensively diseased, partly from the greater natural prominence of the spinous processes in that situation, and partly because that portion of the spine naturally curves in a posterior direction. When the disease occurs in the cervical or lumbar region, the projection is either absent or much less conspicuous, in consequence of those parts of the spine naturally curving in the *anterior* direction, and thus in a measure hiding the deformity.

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* See also "Curvature of the Spine" in a subsequent section of this volume.—H. R. A.

If the case is to terminate favorably, the ulcerative process is arrested, and the remains of the disintegrated vertebral bodies become fused together (*anchylosed*). The ossification also embraces the tissues between the vertebral arches as well as those between the spinous processes, thus binding the whole firmly together, and effecting a permanent cure by rendering the deformity persistent.

Symptoms.—The disease in its earliest stage is not usually characterized by any very prominent symptoms, especially in children. This is very much to be regretted, as it is highly important to recognize the disease before any angular deformity is produced. The attentive observer, however, will be likely to notice that the child is more or less droopy and irritable; that he occasionally complains of pain in the back; and that in the various attitudes assumed while standing and sitting he manifests an unnatural weakness of the spinal column, being either unable to stand erect, or else inclined to support himself by resting his hands or arms upon some near object. When the disease is seated in the cervical region, the movements of the head are more or less constrained, and the patient acquires the habit of supporting the chin with his hands, while the elbows rest upon his knees or, perhaps, the arms of a chair. When in the dorsal or lumbar region, a somewhat similar attitude is assumed, the body being more or less bent forward, and the superincumbent parts partially supported by extending the arms upon a table or other fixed object. In all cases, he moves about with an air of caution, as if sensible of his weakness. If, now, we carefully examine the spine, we shall probably find, about the middle of the dorsal region, that a few of the spinous processes are a little more prominent than the rest, and if we press or tap upon them the child will complain of its producing more or less pain. This, in connection with the other symptoms, pretty well establishes the nature of the affection.

In adults the disease generally begins with pains in some portion of the back or loins, apparently of a rheumatic or neuralgic character; and as the pains shoot round the body or down the thighs the disease is apt to be mistaken, at first, for intercostal neuralgia, sciatica, or some similar affection. But on examining the spine, it will be found more or less tender on pressure at a particular point, and if strongly tapped upon, or a sponge wrung out of hot water be applied to it, the patient will be likely to wince, even if there should be no apparent projection of the vertebræ. The patient will also complain of weakness in the back and legs, which is most marked on going upstairs. The weakness of these parts gives a peculiar shuffling, tottering gait to the patient's walk, causing the latter to resemble somewhat that of a very young child. As the disease progresses, the weakness increases, until at last the patient is unable to lift his legs, or even to stand. The spinal projection also increases, and, if not already existing, an abscess is likely to form. These symptoms are usually accompanied by muscular spasms in the lower extremities, and by a tendency to retention or inconstancy of urine and fæces.

In favorable cases, however, the disease becomes arrested in time to prevent the occurrence of abscess and paralysis, the wasted vertebræ become anchylosed, and the patient recovers with a deformed spine. The angular curvature generally occurs within a period of from six to nine months from the beginning of the disease, and bony anchylosis is usually effected in about three years. If abscess and paralysis set in, recovery is still possible, but the period is often extended to five or six years.

Diagnosis.—If angular curvature has already taken place, there can be no difficulty in diagnosing the case at once. But if no visible change has occurred, the disease is liable to be mistaken for rheumatism, neuralgia, or chronic nephritis. If, however, there should be a continuous pain in the cervical, dorsal, or lumbar region, aggravated by every movement of the spine, with tenderness on pressure, and especially if the sensibility should be increased by the application of heat, or if there should be a tendency, however slight, to a projection of any of the spinous processes, there would be very little room for doubt as to the true nature of the affection. In fact, such evidence would be quite conclusive if the symptoms occurred in early childhood, or at a period when other diseases rarely occur, especially if the patient possessed a scrofulous or tubercular constitution.

Prognosis.—The prognosis is much more favorable in children than in adults, the mortality in their case averaging only about one in twenty, while in adults it is about one in five cases. The rapidity with which the disease runs its course, and the presence or absence of a scrofulous or tubercular diathesis, will also materially affect the prognosis.

Treatment.—Therapeutics.—Asa fœtida.—Caries with curvature, and with thin, fetid pus; parts sensitive to the touch; in scrofulous subjects, and after the abuse of mercury.

Belladonna.—Curvature of the lumbar vertebræ from caries, especially in scrofulous individuals with glandular swellings.

Calcarea carb.—Caries of the spine, with curvature, or with swelling, tenderness, and softening, especially in scrofulous subjects after the suppurative process is fully established.

Oleum jec. asel.—Caries of the vertebræ in scrofulous individuals, or where there is a tubercular family history.

Phosphoric acid.—Vertebral caries occurring in scrofulous children, especially if the disease has induced symptoms of slow hectic fever, or if complicated with an ichorous abscess.

Silicea.—Caries of the spine, with or without complications, but especially if the parts are swollen, hard, tender, or discharging offensive pus.

Sulphur.—Caries with curvature, swelling, softening, or with a history of cutaneous or scrofulous disease.

Theridion.—Scrofulous cases, especially when other remedies fail.

Consult also *Lycopodium*, *Mercurius*, *Pulsatilla*, *Rhus*, *Hepar*, *Nitric acid*, *Sepia*, *Staphisagria*. See also "Spinal Curvature."

Auxiliary Treatment.—During the first stage, or previous to the occurrence of angular curvature, no mechanical support is required, but a recumbent position should be rigidly enforced.

In the second stage, the recumbent position must still be insisted upon, but it should be combined with extension, applied by means of a screw, or a pulley and weight, especially in the case of very young children, or when the disease is seated in the cervical or upper dorsal region. Extension not only renders the distortion much less than it would otherwise be, but it lessens the extent and violence of the disease by removing pressure and irritation from the affected parts.

The most effective and approved local treatment for this stage, however, is that of Dr. Sayre, and other American surgeons, namely, the application, during the suspension of the patient, of a rigid plaster-of-Paris jacket, which effectually secures immobility, relieves undue pressure, and reduces the consecutive excurvation to a minimum.

The same principle, but in a less objectionable form, has been adopted by certain European surgeons, who make use of what is called the "poroplastic felt." This, when softened by steam, is applied whilst the patient is suspended by the head, and is fastened in front in such a way as to be easily removed when required.

As the patient improves, and, in the case of children, even after the disease has ceased, recumbency with mechanical support will still be needed, though not to the same extent as before. It will require, however, to be withdrawn very gradually, especially if the curvature threatens to be considerable, and in some cases it should be continued in a partial or modified form until growth ceases and the spine has fully recovered its normal strength.

SPINA BIFIDA.

Synonyms.—Cleft spine; Hydrorachis congenita; (Fr.) Hydrorachis congénitale; (Ger.) Rückenspalte.

Definition.—A congenital malformation in which there is an arrest of development of some portion of the spinal column, in consequence of which the spinal meninges are left unprotected and, projecting through the vertebral aperture, give rise to a tumor at the part where the arrest of development occurs.

Morbid Anatomy and Pathology.—The deficiency may embrace any number of the vertebral arches, but is generally limited to one or two vertebræ, the laminæ of which are either absent or separated. It may occur in any part of the spinal column, but is almost always confined to the lumbar or lumbo-sacral region; I have, however, met with it in both the dorsal and cervical regions. The tumor corresponds in size and shape to the vertebral opening, being generally about the size of a walnut and of a round or oval form, the long axis corresponding to that of the spinal aperture. In some cases the tumor is lobulated, in others multiple. It is filled with cerebro-spinal fluid, which renders it tense and elastic when the child is held erect, but soft and fluctuating when in a horizontal position. The tension also increases when the child cries or strains, but may be diminished by pressure. The skin covering the tumor may be of its normal color and thickness, but usually it has a bluish or congested appearance, and is more or less attenuated and transparent. In the cervical and dorsal regions the spinal cord and nerves frequently adhere to the walls of the tumor, while in the lumbo-sacral region the nerve-trunks forming the cauda equina often cross the middle of the sac, and, after being reflected from its posterior wall, again cross its cavity in the opposite direction.

Clinical History.—In most cases the tumor increases rapidly in size after birth, and frequently causes convulsions, especially when subjected to external pressure. If, as is sometimes the case, the disease is combined with hydrocephalus, pressure upon the tumor may also give rise to coma and general paralysis. This, however, is not likely to occur if the communication with the spinal canal happens to be very small. The sac may burst during, or shortly after, birth, or, if the integuments are normal, the tumor may gradually enlarge, without causing much inconvenience, up to the period of adult life; but in most cases the walls of the sac gradually inflame, ulcerate, and finally give way, producing convulsions and death. In some cases, however, the fluid has been known to ooze away from one or more small openings, giving more or less relief, and even cures have occasionally taken place in this manner, the tumor contracting, and the aperture finally closing; but this result is exceptional, such cases usually terminating, like the others, in death.

Complications.—Spina bifida is occasionally associated with hydrocephalus, club-foot, and other congenital malformations. Paralytic symptoms may also complicate the case, especially if the nerves of the cauda equina happen to traverse the tumor.

Diagnosis.—It is scarcely possible to mistake spina bifida for an ordinary tumor, as the description above given will readily serve to distinguish it from every other form of morbid growth.

Prognosis.—The prognosis is most unfavorable, almost every case terminating sooner or later in death. Nevertheless, as before stated, spontaneous cures have sometimes taken place, and a number of cases are on record where life has been prolonged by treatment to the age of puberty, and even to a later period.

Treatment.—We know of no well-authenticated instances of recovery by means of internal treatment, but as spina bifida is similar in its nature to congenital hydrocephalus, it is highly probable that the remedies suitable for the latter affection would prove beneficial in the former. Of these, the most important are: *Arsenicum*, *Calcarea carb.*, *Calcarea phos.*, *Helleborus*, *Lycopodium*, *Silicea*, and *Sulphur*.

Auxiliary Treatment.—Simple compression, tapping, excision, iodine injections, and other surgical measures, have been repeatedly tried, but almost invariably without success. A few cases have been reported where small tappings, frequently repeated, and followed by light compression, are said to have been successful, but they proved a complete failure in the only two cases where I have seen them tried, one of which was in the dorsal, and the other in the cervical region. Cases are also said to have been successfully treated by the injection of small quantities of iodine. Thus, Dr. J. Morton, of Glasgow, dissolves ten grains of iodine and thirty grains of iodide of potassium in an ounce of glycerine, and injects half a drachm of the solution, *without allowing the fluid-contents of the tumor to escape*, at intervals of a week or ten days. Dr. Adams asserts* that he has seen a case successfully treated in this way, by Dr. Murray, at the Great Northern Hospital. It must be admitted, however, that all operative measures are extremely hazardous, and should only be undertaken as a *dernier ressort*.

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* Quain's Dict. of Med., p. 1455.

C. DISEASES OF THE PERIPHERAL NERVES.

BY SAMUEL WORCESTER, M.D.

NEURITIS.

Ætiology.—Wounds, contusions, lacerations, pressure of various kinds, exposure to heat and cold, and the extension of inflammation from the adjacent tissues are the most frequent causes of neuritis or inflammation of a nerve. On the other hand, the trunks of large nerves may often be exposed and subjected to irritation without the supervention of neuritis. Inflammation of the nerves is also present in some diseases of the skin, as herpes zoster and lepra anæsthetica. It also occurs as a result of some chronic affections, as syphilis, rheumatism, and some diseases of the joints. Beau has called attention to forms of neuritis of the intercostal nerves which undoubtedly arose from pleurisy and pleuro-pneumonia.

Symptoms.—Neuritis is generally spoken of as *acute* and *chronic*, but Ross adds the further division of *progressive multiple neuritis*, and includes in this variety those cases in which the inflammation attacks almost simultaneously nerves situated in totally different parts of the body, and successively invades a larger and larger number, generally beginning at the peripheral segment and extending towards the centres. In this article the usual division will be followed.

Acute Neuritis.—The attack is ushered in by a chill, followed by feverishness, headache, and sleeplessness, and when the affected nerve is superficial it may be felt as a hard cord under the skin, pressure upon which greatly increases the pain. This pain is generally confined to the region supplied by the inflamed nerve, but when very severe, it may radiate to other nerve-tracts even quite remote. The pain is described as intense, persistent, deep-seated, boring, tearing, and burning, and as being *almost continuous*, and usually with nocturnal exacerbations. Frequently there are partial remissions in the severity of the pain, but perfectly free intervals, as in neuralgia, are of rare occurrence. The course of the inflamed nerve is generally marked by a red line, and there may be patches of herpes or pemphigus, or the skin may be œdematous. In the beginning of the attack the skin is hyperæsthetic, but as the morbid process advances, tactile sensibility and the sense of the appreciation of temperature in the parts of distribution become less, or are entirely abolished, but the perception of pain remains. As a result of this cutaneous anæsthesia the patient complains of numbness and prickling. When the motor nerves are affected, we meet with muscular debility, spasm, and paralysis, as consecutive effects of the pressure from the rapidly formed exudation, and the latter condition tends to become permanent should the function of the nerve not be restored.

Reflex excitability and electric contractility are diminished from the first, and when the disease continues, the muscles begin to atrophy, and then may manifest the "reaction of degeneration."

Chronic Neuritis.—The chronic form either occurs as a continuance of an acute attack, or it may come on slowly and insidiously; it may have a central origin or be idiopathic. The symptoms are very similar to those already noted, and vary according to the character of the nerve affected. "If a compound nerve is the seat of the lesion, the phenomena are in the main anæsthesia, paralysis, and muscular atrophy. If a sensory nerve is the one involved, anæsthesia, and perhaps pain, is the most prominent symptom. If a nerve of special sense is affected, there is disturbance of the function of the nerve as regards the related sense, and this may be either of the character of hyperæsthesia, anæsthesia, or both. If the diseased nerve is purely motor in function, then the results are motor paralysis and muscular atrophy." (Hammond.)

Most observers agree that pain is one of the earliest and most constant symptoms, but Hammond says that chronic neuritis affecting a sensory nerve is not in general characterized by very acute pain, and this is accompanied by anæsthesia of the parts to which the nerve is distributed. This pain varies in its nature and severity. Sometimes it is described as dull and tensive, sometimes as lancinating and tearing; at other times it assumes the character of a neuralgic attack with well-marked remissions and nocturnal aggravations.

As a result of the inflammatory process the nerve becomes changed in color, and so swollen and indurated as to be felt as a thickened cord under the surface. When the products are not deposited uniformly along the course of the nerve, fusiform or moniliform swellings are produced (*neuritis nodosa*). When this swelling exists, the nerve is always very sensitive to pressure.

Motor disturbances are a prominent feature, such as cramp, contractions, paralysis, and resulting atrophy. Trophic changes are also met with. The finger-nails lose their normal character and become horny and curved; the skin becomes rough and exfoliated.

Pathological Anatomy.—The disease consists primarily of inflammation of the nerve itself (neuritis) or of its sheath (perineuritis), but in practice it is impossible to distinguish between the two. The vessels become enlarged and distended, and extravasations take place. The nerve-trunk is swollen from serous, gelatinous, or fibrinous exudations, and the connective tissue is increased in amount. This condition may terminate in resolution or induration, in which latter cases further changes of a trophic character will take place.

Prognosis.—This is doubtful, except in the idiopathic and acute cases; in the latter we may hope for recovery. When the disease has become chronic or is very extensive, it shows itself very obstinate and tedious.

Treatment.—In the early stages of the disease much may be expected from the following remedies: Aconite, Arnica, Belladonna, Calendula, Bryonia, Hepar sulph., Mercurius, and Rhus tox., according to the concomitant symptoms.

Nerve-section has proved useless. Nerve-stretching, a newer procedure, promises to be of service. The use of ice locally, in acute cases, and the galvanic current, in chronic cases, are in accord with the prevailing medical fashion of the day, and should be tried with caution.

NEUROMA.

Synonym.—Tumor of nerve.

Definition.—The term *neuromata* is used to denote the various neoplastic growths or tumors occasionally found closely connected with some one of the peripheral nerves, and concerning whose nature and cause we know but little.

Description, Varieties, etc.—Neuromata are of two kinds, *true* and *false*. True neuromata (neuromata vera) are those wholly or in part composed of nerve-tissue. False neuromata (neuromata spuria) are not composed of nerve-tissue, although situated upon the nerve and closely connected with it. Some writers make the further distinction of *idiopathic* and *traumatic* neuromata.

TRUE NEUROMATA.—These consist of nerve-fibre and connective tissue in varying proportion, so that the tumor is sometimes firm, sometimes soft, sometimes vascular, and sometimes destitute of vessels. From this difference result the various forms of neuromata, such as fibro-neuroma, glio-neuroma, myxo-neuroma, neuroma-teleangiectodes, etc. Ganglion-cells have not been found in neuromata. The spinal nerves are the most frequent seat of neuromata; they are much rarer upon the cranial and sympathetic nerves.

There are two forms of neuromata, differing in their histological structure. In one, called *neuroma myelinicum* by Virchow, medullated double-contoured fibres are common and give to the tumor a medullary white appearance. This form is sometimes seen after amputations. In the other form extremely fine non-medullated fibres are matted together and form a felt-like mass of a gray color, called by Virchow *neuroma amyelinicum*. This is sometimes mistaken for fibroma or fibro-sarcoma.

FALSE NEUROMATA.—The tumors coming under this head are only in a small degree composed of nerve-fibres, and the nerve itself seems affected only by the resulting compression. Various kinds of tumors belong to this class, as follows:

Fibromata.—These tumors are composed of tolerably dense connective tissue, and appear as hard, small knots underneath the skin or along the course of some nerve; to this variety belong the so-called *tubercula dolorosa*, or painful tubercles, which are thus described: "This disease consists in the formation of a small lump or tubercle situated in the subcutaneous cellular tissue, immediately under the integuments, which retain their natural appearance. The tubercle is met with in different parts of the body. It is extremely small, pisiform in shape, of firm consistence, and apparently quite circumscribed. The characteristic feature of the disease is the recurrence of violent pain coming on paroxysmally; the paroxysms vary in duration from ten minutes to upwards of two hours, their frequency as well as intensity appearing to increase in precise relation to the length of time the disease has existed. Some patients enjoy intervals of relief from pain for days or even weeks, while others have repeated attacks in the course of a single day. The paroxysms of pain frequently occur when the patient has fallen asleep. They are also apt to be excited by various external causes, such as pressure and blows."

To this variety also belong the various mammary neuromata which can often be felt as smooth rounded tubercles beneath the skin, and are sometimes painful.

The other varieties of false neuromata are myxomata, gliomata, sarcomata, carcinomata, syphilitic gummata, and lepra nervorum.

According to Dr. Ross, the size of neuromata is extremely variable. Some are not larger than a mustard-seed, while others grow to the size of a man's head; but the majority of them range from between the size of a bean and that of a hen's egg.

The number of the tumors also differs greatly. At times there is only a solitary tumor, while again a large number may be present either at a circumscribed spot or distributed over the body. When the tumors are *locally* numerous, they may either form a series of knots in the same nerve, or numerous knots in the various branches of one trunk or plexus. As many as from five or eight hundred up to several thousand tumors, distributed over all parts of the body, but chiefly in the spinal nerves, have been seen by different observers.

The relations of the tumors to the nerves are variable. Occasionally the new formation is on one side of the nerve, so that the latter seems to run over its surface; at other times it occupies the centre of the nerve; while in still other cases the nerve runs directly into the tumor, the fibres breaking up into a kind of brush or pencil. In true neuromata either the whole or a portion of the fibres of the nerve participate in the new formation; false neuromata proceed for the most part from the neurilemma, and the nerve-fibres may remain more or less intact, or they may be compressed and completely destroyed.

Ætiology.—In many instances it is impossible to determine the cause of the growth. A certain predisposition exists in many persons, especially in those of a scrofulous or phthisical habit. The isolated tumors and fibromata are more common in women, while multiple neuromata occur almost exclusively in men.

Blows, injuries, gun-shot wounds and amputations are the most apparent causes. After amputations the cicatrices are often extremely sensitive, and examination shows enlargement of the bulbous extremity of the diseased nerve. Many cases of this kind were recorded during the war of the rebellion. An instance is given in the *Medical and Surgical History of the War*, where a Minié-ball passed through a man's arm, lacerating in its course the median and internal cutaneous nerves. The wound healed kindly, but a neuroma was found where the nerves had been wounded, embracing the two nerves at that point. The tumor was as large as a small walnut; the neuralgia which resulted was incessant and of the most intense character. Recovery followed under the persistent local use of ice-water.

Symptoms.—The symptoms are variable. Some tumors give rise to no discomfort whatever, while in other cases pain is persistent and distressing. The pain caused by the tubercula dolorosa has been previously described, and is of a neuralgic character. In most cases the character and intensity of the pain seems determined by the closeness of the relation existing between the tumor and the nerve. The pain is increased by atmospheric changes, by pressure, or any movement of the part affected. It may often be made to disappear temporarily by firm pressure on the nerve above the tumor. The pain is more severe in small tumors on peripheral cutaneous branches than in the tumors connected with the more deeply seated nerves. Begbie states that when a single neuroma exists there is almost invariably much suffering; the pain occurs suddenly and paroxysmally, darting along the nerve with the violence and instantaneousness of an electric shock. On the other hand, in those examples which are distinguished by the number of the tumors, it is not uncommon to find these occasioning little or no inconvenience to the patient.

The pain is said to be not so intense with fibromata, syphilomata, or sarcomata, or when the tumor is composed mainly of true nervous tissue, as is the case in stump-growths.

Diagnosis and Treatment.—Beside the foregoing symptoms, the diagnosis of neuroma is based upon the presence, on certain nerves, of round or oval tumors of variable size, which are movable from side to side, but not in the direction of the nerve.

The proper treatment is extirpation with the knife, or, when this is impossible, by electrolysis.

NEURASTHENIA.

Neurasthenia literally means a lack of nerve strength, and may be of two forms: cerebrasthenia, or neurasthenia cerebralis, and myelasthenia, or neurasthenia spinalis.

Neurasthenia is a functional disease affecting the whole nervous system, both cerebro-spinal and ganglionic, and marked by numerous and well-defined, but constantly varying, symptoms, which appear suddenly without any regular order of development, and disappear as suddenly, to be succeeded by others. Thus, a description of neurasthenia is as difficult as is that of hysteria, since the grouping of symptoms may be such as to simulate almost any known disease.

Perhaps in the diseases called functional, more than in any other, is the influence of the neuropathic temperament most strongly shown. This temperament is as truly hereditary in its nature as is the scrofulous, cancerous, or tubercular diathesis; and among the possessors of this temperament we find the greater number of the sufferers from neurasthenia. This form of nervousness is much more common in this country than in Europe, although its existence is recognized there with increasing frequency.

Neurasthenia is preëminently a disease of civilized life, and its causes include almost everything which tends to lower the tone of the nervous system or lessen its stability, either directly or indirectly. The most frequent exciting causes are overwork, worry, anxiety, business disappointment, and excesses of every kind. The tremendous mental strain produced by the feverish struggles to accumulate wealth, to attain political and intellectual distinction, and the demoralizing attempts to keep up appearances, together with the constant violation of the plainest rules of hygiene,—all these unite to exhaust the cerebral energy, and thus induce asthenia.

Symptoms.—A characteristic of neurasthenia, as of all the neuroses, is that the symptoms are both numerous and variable, no two cases being alike. One of the most frequent and important symptoms is tenderness of the scalp, or cerebral irritation, which is said to bear the same relation to cerebral neurasthenia which spinal tenderness bears to spinal irritation. This tenderness, which is often accompanied by heat and pain, may extend over the whole scalp or be limited to certain areas, as the vertex, forehead, or occiput. It is superficial in its nature, so that while the slightest touch, even of the hair, may cause pain, it is somewhat relieved by steady pressure, but sudden removal of the pressure increases it, just as happens in spinal irritation.

Pain, heaviness, and pressure in the back of the head, sick headache, facial neuralgia, and early decay of the teeth are frequent symptoms in neurasthenia, but occur also in any neuropathic subject when the general health is lowered from any cause. Dilatation of the pupils, conjunctival congestion, functional asthenopia, and *muscæ volitantes* are also noticed; the latter symptoms are very annoying, both from the inconvenience they cause and from the suspicions of organic disease which are apt to arise. Pulsations in the ear and various kinds of noises are quite common, especially on lying down at night, when sleep may be delayed or broken by explosive sounds, rushing noises, and the pulsation of the heart. Taste is also perverted in many ways, or it is diminished.

Neurasthenic patients are liable to numbness and tingling in the extremities, or excessive sensibility along the course of some peripheral nerve; this may be limited or general, transitory or persistent; in the latter case the symptoms excite fear lest there be impending paralysis or apoplexy. Under this heading comes the sensation of "pins and needles," and a tendency for the limbs to go to sleep when they are kept for a short time in a cramped position or subject to pressure, as from lying on the arm. The numbness is more frequently observed when the patient lies down, and in slight cases passes off by rubbing or shaking the limb.

Dr. G. M. Beard says that when neurasthenia lays its hands on a man, it is liable to leave its impress on every organ and function of the body; from the crown to the toe there is not a fibre that is safe from attack. If at one stage of the malady certain regions are unaffected, it may be only that they may be attacked with all the greater violence at another stage. Thus the hair, the scalp, the eyes, the ears, the nasal and respiratory passages, the brain, in whole or in part, the cranial nerves, the heart, the spinal cord in any portion, the sensory and motor nerves, the stomach and bowels, the reproductive system, the skin, the nails, the secretions, the excretions, the absorbents, all are objects of assault.

Disturbances of the intellectual powers are very marked. There is an inability to concentrate the attention in writing or reading. A person may read an article or hear a lecture, and be unable to recall a single idea of any value, and on attempting to write a letter be compelled to give it up in despair. A neurasthenic patient on suddenly meeting an acquaintance on the street will be unable to recollect his name, and in conversation, may be obliged to resort to a paraphrase in order to indicate some object whose name he has forgotten; while the very thought of sustained, direct thought at once takes away the ability for mental labor.

The symptom which Richard Grant White calls "heterophemy," that is, saying one thing and meaning another, is sometimes noticed, while mistakes in grammar and spelling are common. Dr. Ross calls our attention to the curious fact that a man who is apt to forget the name of his most intimate friend, who cannot without great difficulty maintain a consecutive conversation for more than a few minutes at a time, who is unable to write a simple business letter, and who cannot concentrate his attention for more than a few minutes at a time upon any ordinary subject, may be quite capable of grasping as well as ever the profoundest speculations of philosophy, and further, that educated men, as a rule, have a tendency, when their nervous systems have become exhausted, to brood over such questions as the relation between matter and mind, the doctrine of free will and the existence of evil, and other great problems of the universe.

Morbid fears of different kinds are of frequent occurrence, and are quite interesting. Fear, so long as kept within certain limits, is physiological in its nature, but when the nervous system is weakened, disordered, and inadequate to fulfil all the demands made upon it, fear may pass its normal limit and become pathological. Undoubtedly, many physicians have known of patients who would walk up and down before the office, and then go away without being able to muster sufficient courage to enter.

There are quite a number of varieties of morbid fears associated with cerebrasthenia, or brain exhaustion, without any hallucinations or delusions. Dr. G. M. Beard, who has made an exhaustive study of neurasthenia, enumerates the following: *Astraphobia*, or fear of lightning and of thunder-storms; *topophobia*, fear of places, including *agoraphobia*, fear of open places; *claustrophobia*, fear of narrow and closed places; *anthrophobia*, fear of men and of society generally, including *gynephobia*, as special fear of women; *monophobia*, fear of being alone; *pathophobia*, fear of disease; *phopophobia*, fear of being afraid; and *mysophobia*, fear of contamination.

The difference between these morbid fears and similar ones occurring in the insane is, that in the latter case they appear as delusions out of which the patient cannot be reasoned, while the neurasthenic patient is perfectly aware of the nature of his condition and the unreasonableness of his fears, which he is anxious to overcome, but is unable to do so.

According to Dr. Beard, these morbid fears are almost invariably symptomatic of functional disease. They come on suddenly, in some cases almost instantaneously, and when once they appear they may exist for months and years, varying in intensity at different times, like other symptoms of cerebrasthenia with which they are associated. These morbid fears are very frequently, though not always or necessarily, the result, in whole or in part, of disorder of the reproductive system; they rarely exist alone, but are usually associated with dizziness, palmar hyperidrosis, flushing of the face, a feeling of profound exhaustion, insomnia, hopelessness, shooting pains in the extremities, excess of oxalates and urates in the urine, heaviness in the loins and limbs, dilatation of the pupils, and local spasms of muscles. Of course, all of these symptoms are not necessarily present in any one case.

Sleeplessness is an almost invariable symptom, and presents different phases in different individuals. Some patients sleep well the first part of the night, and are wakeful and restless the latter part. Others, on going to bed, will lie awake for hours, restless, and revolving in mind every minute detail of the day's history, or some trivial event, or even try to solve some intricate problem in theology. Sleep is often broken with a start, as though the patient were afraid of falling, or as if he were struck. Wearisome, vivid, and distressing dreams are often present, and seem so real as to cause the patient to rise in the morning unrefreshed, and often with a dull, aching head. The neurasthenic patient is often annoyed by a clonic jerking of the extremities, which awakes him with a start just as he is falling asleep. This appears without any warning, and is most likely to occur when preceded by unusual excitement or fatigue. Dr. Beard explains these convulsive symptoms as the effect and sign of congestion in the exhausted nerve-centres, which occur while passing out of the waking into the sleeping condition, because the inhibitory or controlling power of the waking state is removed. I have frequently been troubled with this convulsive jerking after excessive study or when deprived of proper sleep; it has generally occurred when lying down during the day.

In some cases dyspepsia may be one of the earliest symptoms noticed, as it is one of the most persistent. The patient feels worse when the stomach is empty, and relieved when it is full. When the stomach has been for some time without food, there is a feeling of distress, with sinking and craving, which even over-eating relieves. A fair amount of food is taken at each meal, yet a normal sense of hunger is rarely felt. "The stomach never feels as if it were thoroughly empty; it seems as if a portion of the food were retained in the stomach from one meal to another from inability to empty itself, owing to simple inertia, and a certain degree of dilatation of that organ is often to be discovered by physical examination. The introduction of fresh food into the stomach often brings with it a sense of relief and comfort, but this is of brief duration, and soon after a meal the patient experiences a painful feeling of distension in the epigastrium, a sensation of fulness in the head, confusion of thought, an indisposition to undertake any work, and a sense of profound and indescribable misery." (Ross.)

In close connection with this nervous dyspepsia is the functional disturbance of the heart. The pulse is rapid, soft and compressible, and its beats may run as high as 120 in a minute; in exceptional cases the pulse may be slow. The heart is irritable and irregular, and in some cases may intermit. It beats perceptibly and tumultuously, especially under the influence of mental excitement; on the other hand, if the patient exert himself, its action becomes less painfully felt, the pulse becomes strong and regular, and sinks to normal frequency.

Pain and sensitiveness of the spine may be so prominent in a large number of cases as to cause the term myelasthenia to be applied, but the disease is one and the same whether this or that part of the body be mainly affected. In some cases there is acute spinal tenderness, and in others there is a heaviness and dull aching across the loins and back similar to muscular rheumatism. The patient may feel great weariness in the morning before rising, as after a long and fatiguing walk, but this passes away upon motion. Neuralgic pains, similar to those of locomotor ataxia, are occasionally felt in the lower limbs, together with numbness, prickling, and cold feet.

The catalogue of symptoms, both mental and physical, to be observed in neurasthenia, could be continued indefinitely without adding to the clearness of the description already given.

Diagnosis.—The two diseases for which neurasthenia may be mistaken are anæmia and hysteria.

The chief points in the differential diagnosis of neurasthenia from anæmia are given in the following table prepared by Dr. Beard.

NEURASTHENIA.	ANÆMIA.
Chiefly found in nervous diathesis.	Appears also in the tuberculous, or rheumatic, or other, diathesis.
Impoverishment of nervous system; no necessary anæmia. Patient may be plethoric.	Impoverishment of the blood; increase of water, and diminution of the red corpuscles.
Found chiefly between the ages of fifteen and sixty.	Found in all periods of life, from extreme infancy to old age.
Not at all necessarily dependent on any important recognizable organic disease.	More frequently, though not necessarily, associated with some organic disease, as tuberculosis, carcinoma, Bright's disease, etc.
Pulse may be full or normal, but sometimes very rapid or very slow.	Pulse small, weak, and compressible.
No cardiac murmurs.	Murmur at the base of the heart and over the large arteries, as the carotid, subclavian, etc.
No pallor, sometimes even a rubicund appearance.	Very perceptible pallor of the face, especially of the lips.
Easily fatigued by exertion; mental labor in *cerebrasthenia* more exhausting than physical. Memory often temporarily weakened, and consecutive thought and sustained mental activity frequently impossible, even when prolonged muscular labor causes little or no fatigue.	Easily fatigued by exertion; physical labor always more exhausting than mental.

NEURASTHENIA.	ANÆMIA.
Insomnia a very frequent complication.	Insomnia not so frequent a complication, frequently an abnormal tendency to sleep by day as well as by night.
No necessary or constant disturbance of the circulation.	Disturbance of the circulation, with habitually cold extremities.
Habitual mental depression.	Mental depression not so frequent.
Though common to both sexes, not so relatively frequent in females.	Far more frequent in females.
Usually recovers, but gradually, under the influence of rest and nutritious food.	May be rapidly removed by the removal of the organic cause.

It may be distinguished from hysteria as follows:

NEURASTHENIA.	HYSTERIA.
No convulsions or paroxysms.	Hysterical convulsions and paroxysms.
No *globus hystericus*, no anæsthesia of the epiglottis, ovarian tenderness less common, and attacks of anæsthesia far less frequent and less permanent.	*Globus hystericus*, anæsthesia of the epiglottis, ovarian tenderness, and attacks of general or local anæsthesia.
Symptoms more moderate, quiet, subdued, and passive.	Symptoms acute, intense, violent, and positive.
May occur in well-balanced, intellectual organizations.	Usually associated with great emotional activity and unbalanced mental organization.
Very common in males, though more common in females.	Very rare in males.
Is always associated with physical debility.	In the mental or psychical form occurs in those who are in perfect health.
Never recovers suddenly, but always gradually, and under the combined influences of hygiene and objective treatment.	May recover suddenly, and under purely emotional treatment.

The differential diagnosis between cerebrasthenia and myelasthenia is important, as each requires somewhat special treatment. In myelasthenia physical exercise, especially walking and standing, but oftentimes any form of muscular exertion requiring either the upper or lower limbs, is fatiguing and disagreeable. In cerebrasthenia, on the other hand, violent and long-continued muscular exertion can be well borne, and is frequently desired and sought for.

Treatment.—The grouping of symptoms being so varied, there is hardly a remedy in our Materia Medica which may not be useful at one time or another, but I transcribe from Dr. Hart's *Treatise on Nervous Diseases* the following indications for a few remedies as compiled by him:

Arnica.—Weak, pale, nervous individuals, suffering from a general sinking of strength and a disposition to faint; drowsiness during the day, but wakefulness during the night, or until two or three o'clock in the morning; irritable, peevish, and disposed to be quarrelsome; greatly depressed in spirit, and fearful that he will never recover his health; loss of appetite, with a bad taste, desire for sour things, and a repugnance to meat; nausea and empty or offensive eructations; feeling of exhaustion in the chest; pain in the small of the back; yellowish urine, filled with phosphates; trembling in the lower extremities, with great weakness and prostration.

Calcis hypophos.—Nervous prostration with depression of spirits; profuse night-sweats; pale, wan, and emaciated countenance; loss of virile power; habitual coldness and venous congestion of the extremities from debility; sleeplessness, loss of appetite, and emaciation.

Erythroxylon coca.—Sleeplessness and disinclination to work or move; mental depression, with anxiety and palpitation about the heart; pale lips and gums, with quivering of the lips; loss of appetite; constipation with abdominal distension; oppression of breathing, arising from debility; fainting fits from nervous weakness; general debility, the least exertion is attended with fatigue.

Ignatia.—Sleeplessness; apprehension; disposed to weep from the most trifling causes; weakness of memory; alternate excitement and depression; pale, sunken face, or alternate redness and paleness; loss of appetite; feeling of repletion after swallowing the first mouthful; complete absence of the sexual desire; oppression of the chest and breathing from weakness, especially after midnight; palpitation of the heart after eating, or in the morning; coldness of the extremities, with heaviness and weakness.

Phosphoric acid.—Profuse night-sweats, followed by chilliness; cold sweats during the day or on the least exertion; falling of the hair; great fatigue on exertion; loss of virile power; general debility, with feeling of extreme weakness and prostration.

Phosphorus.—This remedy, either in the form of food or medicine, is essential to a cure in most cases. The chief indication is an excess of phosphates in the urine.

Picric acid.—Great chilliness, followed by cold clammy sweat; general lassitude, with great muscular weakness; chilliness, coldness of the feet, and heaviness and weakness of the extremities; profound debility, with speedy exhaustion from the slightest exertion; excess of phosphates in the urine.

Pulsatilla.—Gloomy and melancholy, with constant disposition to weep; anxiety, apprehension, and irresoluteness; pale face, or redness alternating with paleness; want of appetite, with bad taste in the mouth and coated tongue; unsteadiness and weakness of the lower extremities, with heaviness; especially adapted to women whose monthly periods have become deranged.

Rhus tox.—Restless anxiety and apprehension, accompanied with uneasiness about the heart or pain in the small of the back; complete loss of appetite for any kind of food; cutaneous eruptions, as of eczema and acne; heaviness of the lower extremities, with general debility.

Secale cornutum.—Wakefulness at night, or restless sleep with heavy dreams; great depression of spirits, with sadness and anxiety; difficulty of thinking and talking; hardness of hearing, with humming and roaring in the ears; cheeks pale and sunken; aversion to food, with nausea and eructations; anxious and difficult respiration, the result of nervous debility; weakness of the lower extremities, with numbness, insensibility, and coldness; cold sweat.

Zinc. phosphide.—The indications for the employment of this remedy are: brain-fag of business men, who become pale, haggard, sleepless, and suffer from depression of spirits and causeless worry.

In cases of neurasthenia attended with sleeplessness, loss of appetite, emaciation, nervousness, oppression of the chest, night-sweats, and a general feeling of debility, I have obtained excellent results from the use of McArthur's Syr. of the Hypophosphites of Lime and Soda, given in moderate doses.

While medical treatment is of value, the greatest benefits are to be derived from other means, such as proper exercises, freedom from care, abundance of sleep, and good nourishing food. In cases of long standing the only treatment which promises success is that introduced by Dr. Weir Mitchell, and elaborated by Dr. W. S. Playfair, both of whom have by it achieved remarkable success. Originally used in the treatment of those cases occurring in women when there were complications with hysteria and uterine disease, experience has shown it to be of equal value in old, aggravated cases in either sex, accompanied with great mental and physical prostration. On account of the importance of this treatment I prefer to use the words of its originator, as follows:*

"The principal elements in the systematic management of these cases are: 1. The removal of the patient from unhealthy home influences, and placing her at absolute rest. 2. The production of muscular waste, and the consequent possibility of assimilating food by what have been called 'mechanical tonics,' viz., prolonged movement and massage of the muscles by a trained shampooer, and muscular contraction produced by electricity. 3. Supplying the waste so produced by regular and excessive feeding, so that the whole system, and the nervous system in particular, shall be nourished in spite of the patient.

"On each of these I shall offer one or two brief observations:

"1. The removal of the patient from her home surroundings, and her complete isolation in lodgings with only a nurse in attendance, is a matter of paramount importance. This is a point on which I am most anxious to lay stress, since it is the great crux to the patient and her friends; and constant appeals are made to modify this, which I look upon as a *sine quâ non*. I attribute much of the success which I have been fortunate enough to obtain in my cases to a rigid adherence to this rule. In almost every instance of failure in the hands of others of which I have heard, some modification in this rule has been agreed to, in deference to the wishes of friends; as, for example, treating the case in one room by herself in her own house, or in admitting the occasional visits of some relatives or friends. While, however, the patient is to be rigidly secluded, it is incumbent to secure the attendance of a judicious nurse, with sufficient intelligence and education to form an agreeable companion. To shut up a refined and intellectual woman for six weeks with a coarse-minded, stupid nurse can only lead to failure. Whenever my case is not doing well, I instantly change the nurse, often with the happiest results. In addition to the isolation, the patient is put at once to bed, to secure absolute rest. In many cases she is already bed-ridden, in others there has been a weary protracted effort, and the complete repose is itself a great gain and relief.

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* Playfair, W. S., The Systematic Treatment of Nerve Prostration and Hysteria. London, 1883.

"2. Under the second head comes systematic muscular movement, having for its object the production of tissue waste. The so-called professional rubbers are, in my experience, worse than useless, and I have had to teach *de novo* a sufficient number of strong, muscular young women; and the aptitude for the work I find far from common. I cannot attempt any description of this process. I need only say that it consists in a systematic and thorough kneading, and movements of the whole muscular system for about three hours daily, the result of which at first is to produce great fatigue, and subsequently a pleasant sense of lassitude; subsidiary to this is the use of the faradic current for about ten to twenty minutes, twice daily, by which all the muscles are thrown into strong contraction, and the cutaneous circulation is rendered excessively active. The two combined produce a large amount of muscular waste, which is supplied by excessive feeding; and, in consequence of the increased assimilation and improved nutrition we have the enormous gain in weight and size which one sees in these cases, it being quite a common thing for a patient to put on from twelve to twenty-five pounds in weight in the course of five or six weeks. The feeding at regular intervals constitutes a large part of the nurse's work. At first from three to five ounces of milk are given every few hours, and for the first few days the patient is kept on an exclusive milk diet. By this means dyspeptic symptoms are relieved, and the patient is prepared for the assimilation of other food. This is added by degrees, *pari passu* with the production of muscular waste by massage, which is commenced on the third or fourth day. By about the tenth day the patient is shampooed for an hour and a half twice daily, and by this time she is always able to take an amount of food that would appear almost preposterous did not one find by experience how perfectly it is assimilated, and how rapidly flesh is put on. It is the usual thing for patients to take, when full diet is reached, in addition to two quarts of milk daily, three full meals, viz., breakfast, consisting of a plate of porridge and cream, fish or bacon, toast and tea, coffee and cocoa; a luncheon at one P.M., of fish, cutlets or joints, stewed fruit or cream, or a pudding; dinner, at seven P.M., consisting of soup, fish, joint and sweets; and in addition, a cup of raw meat soup at seven A.M., and eleven P.M. Should there be an occasional attack of dyspepsia, which rarely happens, it is at once relieved by keeping the patient on milk alone for twenty-four hours."

The following is Dr. Weir Mitchell's method of employing massage: "The patient lying on a blanket, I begin at the feet by taking up the skin over the whole surface and firmly pinching it, twisting the toes in all directions, kneading the small muscles with the ends of my fingers and thumb, the large muscles of the leg with both hands, grasping alternately, frequently running the hands up the leg, and striking the muscles very often with the side of the hand. Before commencing the kneading of any of the limbs, I rub them freely with neats-foot oil, and I find the more oil a patient's skin absorbs the sooner does she begin to make flesh. The hands and arms are manipulated in the same way, working upwards. The patient, lying flat upon her back with the knees up, the abdomen is first pinched all over, and then the abdominal walls are firmly grasped in both hands, one hand grasping as the other relaxes. This part of the body is finished by the hands being placed one on each side just below the ribs, and firmly drawing the flesh forward, especially in the direction of the colon. Great attention should be paid to this part of the body if the patient is troubled with indigestion. The patient now lies quite flat upon her face. I commence at the nape of the neck and pinch up the muscles on either side of the vertebræ and the whole of the back. Then I place the two first fingers of my right hand, one on each side of the spine, and make a sweep downwards the length of the spine; this I do several times quickly. By working at tender spots longer and gently, I find the tenderness soon disappears. The patient must be taught to relax all the muscles of the body and to lie passive, otherwise she will be much bruised, and the massage, instead of being a pleasure, will be a source of pain. Towards the end of the treatment the limbs are exercised by movements of flexion and extension, especially in the legs of a patient who has not walked for years. For the first day or two I give about twenty minutes, but in about a week I find the patient able to bear the full time (an hour and a half) twice a day, and she should then be left in the blanket for about an hour to rest quietly."

The raw meat soup mentioned above is made as follows: Take one pound of raw fillet of beef, chop it finely, and place it in a bottle with a pint of water and five drops of hydrochloric acid. Stand the mixture in ice all night, and in the morning set the bottle in a pan of water at 110° F., and keep it two hours at this temperature. It is then to be thrown on a stout cloth, and strained until the remaining mass is nearly dry. The filtered liquid is given in two or three doses in the course of twenty-four hours. If the raw taste prove very objectionable, the beef to be used may be quickly roasted on one side, and then the process is completed as above described. The soup thus made is for the most part raw, but has also the flavor of cooked meat.

NEURALGIA.

Definition.—Neuralgia is a functional disease of the sensory nerves, manifesting itself by periodic attacks of intense pain, nearly always unilateral, occurring suddenly and spontaneously in the course of one of the larger nerve-trunks, and ramifying in all, or a few only, of its terminal branches. It is unaccompanied by fever, inflammation, or any appreciable organic lesion.

General Symptoms.—The neuralgic paroxysm may begin suddenly, though it is generally preceded by more or less strongly marked premonitory symptoms, such as sensations of cold, numbness, drawing, formication, or even pain. As Dr. Anstie has pointed out, the condition of the patient at the time of the first attack is always one of debility, either general or special. Patients are frequently attacked for the first time after an exhausting illness or fatigue, or when they are in an anxious condition for some cause or another.

The paroxysm begins suddenly, and is felt as a twinge along the course of the nerve, which instantly ceases, and in a few moments is followed by another of increased severity and duration; the intervals between the pains become shorter and shorter, until the pain seems almost continuous, with, however, paroxysmal aggravation. The pain always follows the anatomical course of some nerve, usually in the direction from the centre to the periphery, passing from the larger to the smaller branches, though the reverse of this is sometimes true. The pain is variously described as tingling, tearing, boring, stabbing, burning or lightning-like, as shooting, darting, lancinating, twisting, wrenching, and as if a coal of fire were being drawn along the nerve. Dr. Hart states that when this pain occurs in the course of a nerve, it is of a shooting or piercing character, but when it affects the terminal branches it is finer, and apt to be of a stinging or burning sort, unless the pain is felt in some solid organ like the liver, in which case it may be of a stabbing or intermittent, aching nature. Periodicity is a marked feature in neuralgia, and while this is the rule when there is any malarial complication, it is very often noticed in cases not connected with malaria. In the latter cases the aggravation is apt to occur in the middle or latter part of the afternoon. The locality of pain may be fixed, or rapidly change from place to place, and the pain is usually increased by movement. The duration of the paroxysm is extremely varied, sometimes continuing a few seconds, and sometimes lasting for a day or two with only slight remissions. The intensity of the pain during the paroxysm may vary from moment to moment, and it may become so atrocious and agonizing as to cause the patient to commit suicide. The paroxysms themselves may occur at intervals of only a few seconds; at other times they are separated by hours, days, or even months.

Painful Points.—Valleix has called our attention to the fact that in most cases of neuralgia a varying number of circumscribed points are to be found along the course of the affected nerve, pressure upon which causes exquisite pain. To these points, which he considered pathognomonic of neuralgia, the term "*points douloureux*" has been applied. Pressure upon these points increases the severity of the pain, and may even induce an attack. These tender spots are found at various points in the course of the affected nerves, where their trunks pass from a deeper to a superficial level, and especially where they emerge from bony canals, or pierce fibrous fascia, or even when the nerves lie on a hard bed, so that they may be easily compressed. Care should be taken not to confound the coincident hyperæsthesia of the skin over the painful points with the pain caused by pressure upon them.

Trousseau contends for the greater diagnostic value of the tenderness upon pressure found in the spinous processes of the vertebra corresponding to the origin of the painful nerve, and which he calls "*points apophysaire*," or spinous points, and he states that "since my attention has been drawn to it I have never known it to be absent." Putzel, however, states that he, in common with many other observers, has found both the *puncta dolorosa* and the *spinous spots* to be absent in a large percentage of cases.

Hyperæsthesia and Anæsthesia.—These conditions are frequently present, and it was originally supposed that the presence of anæsthesia was indicative of some deep-seated nerve lesion. Anstie has shown that diminution of tactile sensibility is frequent even in those cases attended with severe suffering and apparent hyperæsthesia; and Nothnagel has found that in neuralgia of the nerves of the extremities, without any discoverable anatomical lesions, an alteration of the tactile sensibility of the skin is invariably present. As a rule, in recent neuralgia, having a duration of from two to eight weeks, there is *hyperalgesia* of the skin, and in neuralgia of long standing there is *anæsthesia.*

Irradiation of the pain to other sensory nerves is a frequent phenomenon. These pains are not so severe as the original ones; they are apt to rise toward the height of the paroxysm, decrease with it, and pass off before it entirely subsides. They may be felt in the other branches of the affected nerve, in neighboring nerves, or even in nerve-trunks at a distance. "When, for instance, one branch of the fifth is primarily affected, the pain spreads to the two others; next in frequency from one nerve, as the sciatic, to the corresponding one on the opposite side; and lastly to quite different nerve territories, as from one of the intercostal nerves to the fifth" (Ross).

Motor and Trophic Complications.—Motor disturbances appear either as convulsive or paralytic symptoms. "All possible grades of motor irritation may be observed, from fibrillar contractions and slight muscular twitchings to tremors, contractions, spasms, and even fully developed and severe convulsions, such results being not uncommon in sciatica" (Erb). The reflex spasm is most marked in *tic douloureux*, in which the muscular twitchings, induced by neuralgia of the fifth pair, appear in the facial muscles which are supplied by the seventh. They vary from slight fibrillary twitchings to well-marked spasm.

The direct convulsive movements are best observed in sciatica. Paralytic symptoms are usually observed after the disease has lasted a long time, and begin as muscular debility.

The *trophic changes* are both interesting and important, as the effects produced are quite lasting. The skin may be the seat of a simple erythema, or there may be an eruption of an erysipelatous character, which is, however, never very severe, limited to the region of the affected nerve and confined to the face. The eruption of urticaria and pemphigus generally accompany severe forms of the disease, while herpes zoster is observed almost exclusively in trigeminal and intercostal neuralgia, especially the latter.

The appendages of the skin share in these changes; the hair changes color, becomes coarse and brittle, or may fall out; the nails become marked with furrows, are deformed, pale, and discolored. The muscles, in some cases, undergo atrophy which cannot properly be considered as mere effects of disuse. Anstie states that "the periosteum of bone and the fibrous fasciæ in the neighborhood of the painful points of neuralgic nerves not unfrequently take on a condition of subacute inflammation, with marked thickening and tenderness on pressure."

Ætiology.—Especially in the production of the functional nervous diseases does the hereditary neuropathic predisposition play an important part. This predisposition may manifest itself in different members of the same family under the various forms of neuralgia, insanity, epilepsy, chorea, hysteria, paralysis, and phthisis; and these diseases may appear interchangeably in the different generations. Hence it may be seen how important a place should be assigned to the inheritance of the nervous temperament as a predisposing cause. Next in importance to heredity comes debility; as was remarked above, Anstie considers debility to be always present in some form or another on the occasion of a first attack. Whatever tends to lower the general health and vitality, whether it be anæmia, sexual excesses, prolonged lactation, hæmorrhage, mental anxiety, loss of sleep, or excessive brain-work, will favor the development of neuralgia. Malaria, which in certain districts constitutes one of the most important factors in the ætiology of neuralgia, is hardly recognized as such elsewhere. Thus Anstie states that he has met with but two undoubted cases, and one doubtful case of malarial neuralgia, in all of which the fifth nerve was affected. Putzel says that in the majority of cases it affects the supraorbital branch of the trigeminus (popularly known as brow-ague), and the paroxysm of pain appears instead of the full-blown malarial attack.

Wounds and injuries, as from a blow or fall, diseases, especially cancer, implicating some nerve-trunk, caries of the teeth, rheumatism, and exposure to cold and damp are well-known causes.

Pathology.—So far as our knowledge extends, neuralgia has no pathology. It is true that innumerable anatomical changes have been found both in the nerve-tissue and in the surrounding structures, but in a large number of cases no lesions whatever are discovered; hence it is evident from the negative results of the examination in many cases, and from the multiplicity of the lesions in others, that there are no post-mortem appearances peculiar to neuralgia, and Billroth has stated that "he is tired of making the examination."

There is no agreement among different observers even as to the site of the lesion. Anstie firmly holds to the belief that the morbid process is situated in the posterior roots of the nerves or in the gray matter immediately connected with them. He also holds that "the morbid change in the nerve-centre is probably, in the vast majority of cases, an interstitial atrophy, tending either to recovery or to the gradual establishment of gray degeneration, or yellow atrophy, of considerable portions or the whole of the posterior root, and the commencement of the sensory trunk as far as the ganglion." Putzel is of the opinion that while Anstie's theory probably holds good with regard to a considerable number of neuralgias, notably those which are due to hereditary influences or to constitutional diseases, it is far from being conclusively proven, but may be accepted as a good working theory. The greatest objection to Anstie's view is that these lesions have never been found in neuralgia, although frequently sought for; though possibly they may be of a molecular or chemical nature.

Diagnosis and Prognosis.—When the pain follows the course of a nerve the diagnosis is sufficiently easy, but when it affects an organ or a diffused space, it may be mistaken for rheumatism, myalgia, locomotor ataxia, neuritis, spinal irritation, or the bone pains of syphilis. It is well to keep in mind the following characteristics:

"1. The pain is always paroxysmal, at least in the beginning, and exacerbations are manifested even after the disease has lasted for years.

"2. The paroxysm usually begins suddenly, the pain is shooting, darting, lancinating, boring, etc., and is referred along the course of the nerve.

"3. The paroxysm develops spontaneously, or in consequence of some trifling cause not at all commensurate with the severity of the pain produced.

"4. In the majority of cases puncta dolorosa are observed in some portion of the course of the nerves.

"5. Vaso-motor, secretory, or trophic disorders are noticed in a considerable proportion of cases." (Putzel.)

The prognosis is generally favorable. Death seldom results from neuralgia, although the frequency and severity of the paroxysms often render life a burden and enfeeble the health. Most neuralgias may be much benefited by treatment, and many cases can be cured.

Treatment.—The medical treatment will be given in the sections devoted to the special forms of neuralgia. Much may be done by the way of prophylactic measures in warding off an attack or in easing its severity. The person who is subject to neuralgia should take regular and systematic exercise of such a nature as will bring every muscle into play. Mental excitement and bodily fatigue of every kind should be avoided; also exposure to cold winds and dampness; fresh air, however, is essential to health. The patient should be encouraged to seek regular and abundant sleep, and ten hours is better than less. The use of alcoholic liquors and excesses in eating or drinking should be forbidden, and the sexual impulse restrained.

During the attack the services of the physician will be in demand, and he will be implored to do anything that will afford even a prospect of relief. And here too much cannot be said in condemnation of the use of opium or morphia in any form, whether by the mouth or in the form of subcutaneous injection. While the relief is only temporary and in many cases is obtained no quicker than from the carefully-chosen homœopathic remedy, the patient almost invariably falls a slave to the morphine habit.

If the patient insists upon the use of this agent, the subcutaneous injection of a small quantity of distilled water, blood-warm, may be tried, and in some cases prompt relief follows, while in others it proves useless; the same is true of the use of morphia.

Cold or hot applications are of service in many cases, and the patient should be kept as quiet as possible and in a darkened room. Much may be done by a few cheerful words of confidence from the physician as to his ability to give speedy relief. As a strong mental emotion is sufficient to induce an attack, surely an equally strong psychic force of a cheerful, hopeful kind is as likely to relieve or palliate the paroxysm.

Of course, in every case careful inquiry should be made as to the possible presence of any removable source of irritation, such as a spicula of bone, an offending tooth, etc.

In neuralgia especially brilliant results have been obtained by the use of electricity, particularly the galvanic current. That this is homœopathic to the disease has been clearly shown by Dr. Butler, in his text-book of electro-therapeutics, who concludes that a strong current of electricity, transmitted through a nerve in any direction, causes a condition similar to neuralgia, and that a weak current will cure neuralgia when occurring idiopathically. Erb, Putzel, Anstie, Althaus, and Hammond all unite in praising the virtues of the galvanic current, and deprecate the value of the faradic in this affection. My own experience and observations lead me to agree with Dr. Butler, who says that "the reason of this must be that those physicians, in endeavoring to produce an effect on the hyperæsthetic nerve, transmit a current of too great intensity through it, which it will in no instance tolerate without the most excruciating aggravations being produced." He gives the following rules which are of too great practical importance to be omitted here:

1. That whatever form of current be used, only the very mildest intensities are curative.
2. That a large percentage of cases are curable by strict attention to this rule.
3. That high intensities of either form of current produce serious aggravations.
4. That a certain proportion of cases yield to the galvanic current that cannot be cured by the faradic, and *vice versa.*
5. That it is impossible always to tell beforehand which form of electricity will cure any given case any more than we can always tell which potency of a drug remedy is the proper one to use.
6. That there are undoubtedly a small proportion of cases that will yield to neither form of current administered alone, that will rapidly improve under a judicious alternation of the forms.
7. That the number of cases which entirely resist every form of electrical treatment is very small indeed.
8. That where the nerve is deeply seated, electro-puncture of the sheath, or even of the nerve itself, becomes necessary, as otherwise recomposition takes place in the more superficial structures, without the current reaching the nerve at all. This operation must be performed with great care.

In considering the special forms of neuralgia, the classification of Valleix will be followed, viz.:

(*a*) Neuralgia of the fifth (trifacial or trigeminal) nerve.
(*b*) Cervico-occipital neuralgia.
(*c*) Cervico-brachial neuralgia.
(*d*) Dorso-intercostal neuralgia.
(*e*) Lumbo-abdominal neuralgia.
(*f*) Crural neuralgia.
(*g*) Sciatic neuralgia.

NEURALGIA OF THE FIFTH NERVE.—*Synonyms.*—Facial neuralgia, Prosopalgia, Fothergill's facial pain, Tic douloureux, Trigeminal neuralgia.

This is the most frequent and, with perhaps one exception, the most severe form of neuralgia. It is unilateral in almost all cases. and may involve the whole nerve, or one of its divisions, or a single filament only.

The *causes* of neuralgia have been fully set forth in the introductory section upon general causes, but the special frequency of this form of neuralgia is sufficiently accounted for by " the extensive distribution and subdivision of the fifth nerve, by the anatomical relation of its branches, which have to traverse numerous fissures, foramina, and bony canals, and are therefore exposed to mechanical injury; by the relations of its branches to various important organs the disturbance of which may extend to the nerves supplying them; and lastly by the circumstance that the face is more exposed than other parts of the body to external injury, cold, wounds, etc." (Erb).

Women seem more liable to trigeminal neuralgia than to any other superficial variety of the disease except mammary neuralgia. The greatest number of neuralgias occur in the winter, and, next to sciatica, neuralgia of the fifth nerve is most frequently produced by cold. Other leading causes are heredity, prolonged and excessive intellectual exertion, anæmia, prolonged lactation, anxiety, malaria, the changes incident to the climacteric, various peripheral irritations, and over-exertion of the eyes, the last being regarded by Dr. Anstie as a very fruitful cause.

Symptoms.—The symptoms of facial neuralgia are of a typical character, but present some special phenomena according to the particular nerve-branch affected. Occasionally there are precursory symptoms of discomfort, malaise, itching, and formication; or sensations of a stiffness or tenderness of the skin over the nerve which is to be attacked. It is said that in rare cases an actual aura is perceived, proceeding from different parts of the body, and regularly ushering in the several paroxysms. Generally, however, the attack begins suddenly and without warning.

In the lighter cases the pain may be continuous and moderate in character, with occasional exacerbations of an intense lancinating pain like lightning. In the majority of cases the attacks are severe, and the patient is at a loss to find words strong enough to express the excruciating agony from which he suffers. This pain at times seems seated deep in the bones, and at other times is distinctly referred to the course of the nerve. An attack is made up of recurring paroxysms which generally begin with pains of moderate severity, of a fugitive, darting character; these pains pass off in a few seconds, leaving the patient wholly or comparatively free. With each succeeding paroxysm the pains increase in severity and last longer; the interval of remission is shorter, and during it the patient continues to suffer from a dull aching pain which causes great discomfort and prevents sleep. A paroxysm may be excited by any emotion or fatigue, by a current of air, or even by washing the face.

The pains have a general shooting, lancinating character, and are described as tearing, boring, like lightning, stabbing, and as if a red-hot wire were drawn along the course of the nerve. The patient resorts to many expedients to relieve his sufferings; one will press the cheek firmly with the hand or against some hard substance; another will rub the face so forcibly and continuously as to denude it of the skin and beard.

In severe attacks of this form of neuralgia, radiation of the pain to other nerve-tracts is a prominent feature. "When one branch of the fifth is affected, the pain extends during the paroxysm to the other branches of the same nerve or to the occipital nerves, and it may extend in severe cases to the neck, shoulders, or any part of the area of distribution of the intercostal nerves, especially the mammary gland." (Ross.)

Painful points are noticed where the nerve emerges from some foramen or where it penetrates the deep fasciæ.

Spasms of the facial muscles, of a varying degree of intensity, are often present. This may appear as spasm of the muscles around the eyes (blepharospasm), or it may affect the muscles at the angle of the mouth, or it may be of that variety to which the term *tic douloureux* or *tic epileptiform* has been given. In this last form, violent and sudden twinges of pain are accompanied by very forcible spasms of the facial muscles.

Coming now to disturbances of another kind, we meet with marked hyperæmia of the conjunctiva and an increase in the lachrymal secretion. The trophic changes spoken of in the introductory section are most common in facial neuralgia. Herpes zoster, while a more frequent accompaniment to intercostal neuralgia, is also met with here as zoster frontalis when the ophthalmic branch is affected, and more rarely as herpes labialis in neuralgia of the second and third divisions of the nerve.

NEURALGIA OF THE FIRST BRANCH.—*Ophthalmic Neuralgia.*—This branch of the fifth is distributed to the side of the nose, the eyelids, the lachrymal gland, the globe of the eye, the conjunctiva, the forehead, and the scalp.

Dr. Hammond says that the most common form of neuralgia affecting the ophthalmic branch of the fifth is hemicrania, also called migraine and sick headache, but Dr. Hart calls attention to the fact that hemicrania is not a true neuralgia. The pain in true hemicrania is of a dull, throbbing character, and is felt deep within the skull. Putzel, too, emphasizes this distinction, and says that hemicrania is now almost universally considered to be a neurosis of the sympathetic nerve.

When caused by exposure to cold or malaria, the supraorbital twig is oftenest affected, causing characteristic symptoms, pain in the forehead, either localized or extending down to the nose, intense hyperæmia of the conjunctiva, a profuse secretion of tears, and in nearly all cases a well-marked painful spot at the supraorbital foramen. This last symptom is very prominent in those cases of the so-called "brow-ague" which are of malarious origin. Not unfrequently eruptions of an herpetic and erysipelatous form are present upon the upper eyelid or forehead, and are important as indicating a possible extension of the inflammatory action to the iris and cornea.

A somewhat rare form of ophthalmic neuralgia is that in which the eye itself is affected, causing ciliary neuralgia. The patient suffers from paroxysms of pain in the globe of the eye and eyebrow, accompanied by lachrymation and dread of light. This may occur periodically and without warning, or as an accompaniment to a severe "head cold," as observed several times in one of my own patients. The eye becomes intensely painful, intolerant of light, and suffused with tears; the inflammation of the conjunctiva and other objective symptoms are very slight, however, in proportion to the amount of pain and photophobia. Arsenicum, which is the remedy that I have found of most service in this case, is also the one which Dr. Wilks most strongly recommends in similar cases.

NEURALGIA OF THE SECOND BRANCH.—*Supramaxillary Neuralgia.*—In this variety the pain may be situated in the cheek, eyelid, lateral portion of the nose, and upper lip (infraorbital nerve), in the zygomatic arch and anterior temporal region (orbital nerve), in the upper row of the teeth (dental branches causing odontalgia), and in the nasal cavities and gums (palatine nerves).

NEURALGIA OF THE THIRD BRANCH.—*Inframaxillary Neuralgia.*—This branch of the nerve is distributed to the cheek, the tongue, the lower jaw and teeth, and to the submaxillary gland. Putzel states that in neuralgia of the superior and inferior maxillary branches, the vasomotor complications are very prominent; the pain, too, is often intense, occurring in paroxysms. Some cases are relieved by rubbing the affected parts, whilst in others the merest touch will start the paroxysm. The face is red and hot and perspires profusely, and the carotid throbs violently. The secretion from the nose on the affected side is usually increased; the tongue may be furred on the painful side and the buccal secretions increased in amount.

The principal painful points observed are the following: "In neuralgia of the ophthalmic branch, a *supraorbital* point at the supraorbital notch; a *parietal* point at the summit of the parietal protuberance; a *nasal* point at the upper part of the lateral aspect of the nose. In neuralgia of the superior maxillary branch, we find an *infraorbital* point at the infraorbital foramen; a *nasal* point at the lower part of the lateral aspect of the nose; a *malar* point over the middle of the malar bone; a *superior gingival* point in the upper gums. In neuralgia of the inferior maxillary nerve, a *temporal* point immediately in front of the lobe of the ear; a *mental* point at the mental foramen; and an *inferior gingival* point in the lower gums." (Putzel.)

Diagnosis.—In most cases the diagnosis will not be difficult. Facial neuralgia may be confounded with toothache or the pains of periostitis, or with inflammation of the lining of the frontal sinuses; but in the latter cases there are attendant swelling and tenderness. Migraine or sick headache was formerly regarded as a form of neuralgia, but is now classed as a neurosis of the sympathetic nerve. It may be distinguished from facial neuralgia by the gradual increase of the pains, the shorter duration of the attacks (generally lasting less than twenty-four hours), their much rarer appearance, the deep-seated, pulsating character of the pain, and great mental irritability. Hysterical clavus is marked by a peculiar pain limited to a few definite points, and compared to that produced by driving a nail into the skull. In anæmic or dyspeptic headache the pain is diffused over the forehead or vertex; it is deep-seated, dull, tensive, and continuous.

CERVICO-OCCIPITAL NEURALGIA.—This form of neuralgia is situated in the region of distribution of the first four cervical nerves, affecting (1) the great occipital nerve, (2) the small occipital, (3) the great auricular, (4) the inferior subcutaneous nerve of the neck, and (5) the supra-clavicular nerves. The great occipital nerve is most frequently affected (occasionally on both sides), the other forms are rare. In some instances there is a tendency for the pain to invade the lower portions of the face and become indistinguishable from neuralgias of the third branch of the fifth pair; such cases are accompanied by irritation and swelling of the cervical glands.

The pain is similar in character to that of prosopalgia, but as a rule is not so severe. The painful points are those at which the nerves become most superficial.

The *prognosis* is said to be favorable, most cases recovering after a short period under appropriate treatment.

CERVICO-BRACHIAL NEURALGIA.—Neuralgia of the brachial plexus presents but few points calling for special consideration. It may occupy the whole plexus, viz., that formed by the union of the four lower cervical and first dorsal nerves, together with a fasciculus from the fourth cervical, and thus involve the larger portion of the arm and shoulder, or it may be confined to a few of the nerves of the arm. Reynolds states that the most common seat of brachial neuralgia is the ulnar nerve.

Women seem more frequently attacked than men, and the causes assigned are hysteria, anæmia, exposure to cold and wet, and over-exertion of the arm. Myalgia and rheumatism are the affections for which it may occasionally be mistaken.

DORSO-INTERCOSTAL OR INTERCOSTAL NEURALGIA.—This form of neuralgia is generally unilateral and has its seat in the region of distribution of the sensory fibres of the twelve pairs of dorsal nerves. The left side is most frequently affected, the fifth to the ninth intercostal nerves being most liable to attacks. I have occasionally met with cases where the female breast was the seat of this neuralgia, the pain being quite intense, and aggravated at the menstrual period. In such cases Cimicifuga has always given prompt relief.

Many cases of herpes zoster or shingles are associated with intercostal neuralgia of an intense and persistent type. It generally precedes the eruption, is not modified by it, and may continue for weeks or months after its disappearance.

Arsenicum, Graphites, Rhus tox., and Zincum met. are the remedies that have proved most efficacious in my hands, both in relieving the neuralgia and curing the eruption. Lately, various preparations of Menthol have been strongly indorsed as local applications for relieving the pain.

Putzel calls attention to the fact that intercostal neuralgia differs somewhat from other varieties in that the patients often suffer from a dull, steady pain along the nerve during the intervals between the paroxysms, and this inter-paroxysmal pain is often a source of much distress; it is sometimes so severe that the patients are compelled to restrain the movements of respiration on one side as in cases of pleurisy.

Pleurodynia and lumbago are intercostal neuralgias where the pain is confined to a fixed spot and limited area. The former term is used when the affection is supposed to be rheumatic in its origin, and the latter when caused by over-exertion or a strain.

The *causes* are catching cold, rheumatism, malaria, exhaustion, anæmia, etc. The *prognosis* is generally favorable.

LUMBO-ABDOMINAL AND CRURAL NEURALGIAS need only be mentioned by name,—and we pass to—

SCIATICA.—Sciatica generally affects persons between thirty-five and fifty years of age, and is one of the most frequent and severe forms of neuralgia. Men are more liable to it than women.

Sciatica may affect the greater portion of the posterior portion of the thigh, commencing at the point of exit of the nerve, and extending all down the back part and side of the leg and the whole foot. The term is somewhat loosely employed, and is undoubtedly made to include cases of osteo-arthritis, pelvic abscess, etc.

In only exceptional cases do the paroxysms begin suddenly. There is usually a premonitory stage marked by a feeling of heaviness, numbness, or tingling; this is followed by a dull, heavy ache, gradually growing more intense and aggravated by muscular exertion. Soon the pain becomes paroxysmal in its nature, and so agonizing as to cause the bravest to cry out in despair. The pain seems like a succession of electric shocks, or is lancinating and darting in its character, and is often accompanied by severe muscular contractions. Dr. Wilks calls attention to the fact that in other neuralgias the pain is felt in the distribution of the nerve or periphery, and not in the trunk itself, whereas in sciatica the pain is mainly or exclusively in the trunk itself, so that the patient can often trace the course of the nerve with his finger with perfect accuracy.

Catching cold, exposure to dampness, injury, as from gunshot wounds, and mechanical pressure are the most frequent exciting causes. Any affection which interferes with the return of venous blood from the pelvis will predispose to its development, and, as said above, men seem more liable to the disease than are women in the proportion of nearly two to one.

In severe cases the patients are more comfortable lying upon the back in bed, the thigh brought close to the trunk and the knee flexed. The slightest movement or even the contact of the bed-clothes is sufficient to bring on a severe paroxysm. Fibrillary twitchings are also met with, especially in the muscles of the calf and of the back of the thigh. At first the pain interferes with locomotion, but at a later period walking again becomes possible, but is attended with a peculiar one-sidedness and lameness. The patient in walking keeps the limb slightly flexed at the knee, and walks on the toes of the affected foot.

The points most sensitive to pressure are a gluteal point, beneath the gluteal fold, between the trochanter major and the tuber ischii; a point where the nerve emerges from the sciatic notch, and at the sacro-iliac articulation.

Sciatica rarely attacks both sides at once. Dr. C. P. Hart, in speaking of its diagnosis, says that it never attacks both limbs at once, but Romberg, Valleix, Rosenthal, and others, claim to have observed the bilateral form. My own experience, however, agrees with that of Dr. Hart.

In addition to the resulting contractions and various trophic changes mentioned by various authors, Dr. Hart speaks of a peculiar glossy condition of the skin noticed by him after traumatic lesions of the sciatic nerve. A number of such cases were noticed by him during the war of the rebellion.

Prognosis.—Most cases may be expected to recover, but as a rule the attack will last for weeks, and in some cases for months. Even after convalescence has seemed to be fairly established, any imprudence, whether mental or physical, will bring about a relapse, and the patient will seem as ill as ever. For a long time after other symptoms have disappeared there may be a stiffness or difficulty in walking.

Treatment.—The use of electricity gives excellent results in the treatment of sciatica, relieving the severity of the pain, and in some cases curing the patient. A galvanic current of moderate power is to be used; the positive pole may be placed over the point where the sciatic nerve emerges from the sciatic foramen. This point may be found by "placing the thumb of the hand corresponding to the affected limb over the tip of the trochanter major, and the middle finger over the tuber ischii; the tip of the index finger will fall directly over the great sciatic foramen." The negative pole may be placed in the popliteal space, or wherever there is most pain along the course of the nerve. Dr. John Butler and Dr. W. A. Hammond recommend galvano-puncture or farado-puncture of the sheath of the nerve, or of the nerve itself, and report excellent success, especially in fleshy patients.

The operation of *nerve-stretching* has lately come in use and is especially serviceable in those cases where a neuritis has been thought to exist. Five cases operated upon by Professor Hammond were permanently relieved. In two instances the use of anæsthetics was omitted, in others the ether-spray was employed, so as to abolish the sensibility of the skin. "The patient should be sensitive to pain while the stretching is being performed, as important information is derived from the sensations, the object being to carry the stretching to the point of producing very decided numbness." Dr. Hammond always performs the operation on the nerve at about the junction of the middle and lower thirds, that being the point at which it is more readily reached. An incision is made four or five inches in length through the skin and aponeurosis, exposing the nerve. An ivory paper-knife or the index finger is then passed under the nerve, which is gradually lifted from the bottom of the wound, and stretched to the extent of three or four inches, traction being made at the same time in a downward direction.

Firm compression of the nerve seems better adapted to some cases of facial neuralgia, where the nerve passes over a bony surface, thus allowing considerable pressure to be used.

Hot fomentations, cold water and sea bathing have all been found useful; experiment alone will show which of these agents will be of most value in any given case.

Dr. Radcliffe first noted the circumstance that many persons predisposed to, or suffering from, attacks of neuralgia are found to have cherished a dislike to fatty food of all kinds and to have systematically avoided its use; and he reports curing a number of cases after the adoption of a simple alteration in their diet, by which the proportion of fatty ingredients was increased. For this purpose butter, cream and olive oil are very useful; cod-liver oil is strongly recommended, but its nauseous taste makes its use objectionable even in those cases where the stomach does not reject it.

Mental and physical rest and good nourishing food are of the highest importance in the treatment of all forms of neuralgia.

The value of *Aconite* in the treatment of trigeminal neuralgia is acknowledged by the authorities of both schools of medicine. Putzel says that "after the enthusiasm of some observers has been moderated, and the indications with regard to its use have been more clearly defined, it will assume its position as one of the best remedies for the disease under consideration." The homœopathic materia medica fully supplies these needed indications in a clear and direct manner.

Actæa racemosa, or Cimicifuga, Gelsemium, Arsenicum, Strychnia, Iodide of potash, Mercurius, and Zinc in its different forms are all used by the homœopathic and allopathic schools; their use by the latter, however, is empirical and marked by many failures. Other remedies whose usefulness has been thoroughly demonstrated are Arnica, Belladonna, Bryonia, Colocynth, Kalmia latifolia, Argent. nit., Lachesis, Rhus tox., and Sulphur. For the special indications calling for these remedies the reader is refered to the Materia Medica.

LOCAL ANÆSTHESIA.

By the term anæsthesia we mean that the transmission of stimuli to the sensorium by means of the afferent nerves is either diminished or suppressed. This may be due to cerebral, spinal, cerebro-spinal, or peripheral causes; the last alone will be considered here, as the others receive due attention elsewhere.

CUTANEOUS ANÆSTHESIA is marked by the impairment, perversion, or abolition of the *tactile sense* of the skin. When the sensibility to pain is diminished or lost, the condition is styled analgesia or analgia. Through the skin we get both tactile and common sensations; to the first we refer sensations of pressure, of temperature and locality; and to the latter we ascribe the sensations of pain, itching, tickling, etc. One or all of these sensations may be impaired or abolished, when we have what is called total or partial paralysis of sensation or touch.

The amount of cutaneous anæsthesia cannot be determined by the statements of the patient, which are generally vague and unsatisfactory. Careful examination should be made with the æsthesiometer or a pair of compasses, the patient being blindfolded. Tests of the ability to distinguish weight, and the difference between heat and cold should also be made, while diminution or loss of the common sensations should be determined by pinching, tickling, application of the faradic brush, and pricking with a needle.

Peripheral anæsthesia may be accompanied with disorders of nutrition from defective blood supply; hence bed-sores result. Another evidence of the derangement of the circulation is shown by a change in the color of the affected part, which may become livid or blue. The temperature too of the affected parts is always diminished, as may be shown by the thermo-electric apparatus.

In some cases the patient is unconscious of the presence of his limbs, and when walking feels as though he were stepping on air.

Cold bodies, when applied to the skin, may feel hot, and hot bodies cold.

When cutaneous sensibility is diminished the patient frequently complains of various paræsthesiæ, such as tingling, "pins and needles," a feeling as if ants were crawling over the skin, as if the hands were covered with gloves, and as if he were walking on wool.

The anæsthesia may be limited in extent to certain portions of the cutaneous surface; for instance, there may be an anæsthetic zone around the body at different levels according to the seat of the primary lesion. When it is limited to the lower extremities and lower half of the body, the affection is called para-anæsthesia. If a lateral half of the body only is affected, the term hemi-anæsthesia is used.

Peripheral cutaneous anæsthesia may be due to a variety of causes which produce irritation of the skin, such as exposure to intense heat or cold or to ether-spray, rheumatism, wounds, ischæmia, and the frequent immersion of the hands in water strongly impregnated with soap or other alkali.

The anæsthetic symptoms alone will rarely be definite enough to indicate the proper remedy, and we will also have to take into account the accompanying symptoms and conditions.

MUSCULAR ANÆSTHESIA has been described in another article.

ANÆSTHESIA OF THE NERVES OF SPECIAL SENSE does not come within the scope of this work.

ANÆSTHESIA OF THE TRIGEMINUS, FACIAL NERVE, OR FIFTH PAIR.—This may be caused by central or peripheral lesions, and, in either case, is indicative of serious disease. The peripheral lesion may result from inflammation or atrophic changes, either in the nerve itself or in the Gasserian ganglion, from injuries or exposure to cold. Render says that the majority of cases of anæsthesia of the facial nerve are due to neuritis.

The *symptoms* vary according to the seat and extent of the lesion, and the anæsthesia may be limited to the area of distribution of a single branch of the nerve.

"When all the branches of the nerve are affected, one side of the face, part of the ear, the skin of the temple and forepart of the head, the conjunctiva corneæ, nasal and oral mucous membranes, the tongue, gums, and part of the pharynx are all rendered more or less completely insensitive on the affected side; and yet, violent eccentric pains may be felt in the anæsthetic area (anæsthesia dolorosa). When the patient puts a cup to his lips it gives him the impression of being broken, as he can only feel with one-half of the lip." (Ross.)

The following proposition, formulated by Romberg, will be of service in deciding as to the seat of the lesion:

"The more the anæsthesia is confined to single filaments of the trigeminus, the more peripheral the seat of the cause will be found to be.

"If the loss of sensation affects a portion of the facial surface, together with the corresponding facial cavity, the disease may be assumed to involve the sensory fibres of the fifth pair before they separate to be distributed to their respective destinations; in other words, a main division must be affected before or after its passage through the cranium.

"When the entire sensory tract of the fifth nerve has lost its power, and there are at the same time derangements of the nutritive functions in the affected parts, the Gasserian ganglion, or the nerve in its immediate vicinity, is the seat of the disease.

"If the anæsthesia of the fifth nerve is complicated with disturbed functions of adjoining cerebral nerves, it may be assumed that the cause is seated at the base of the brain."

The remarks upon the treatment of cutaneous anæsthesia apply equally well here, and there is but little that is encouraging to offer. If electricity is used, care should be taken not to employ too strong a current.

LOCAL SPASMS.

Synonyms.—Peripheral spasm, Functional spasm, Cramp, Neural spasm.

The use of the term "spasm" should be confined to the description of a morbid excess of motion in the unstriped contractile fibres, which are animated by ganglionic or sympathetic nerves; but the terms "spasm" and "convulsion" are both commonly used to indicate the sudden and involuntary contraction of muscular fibres or of muscles—more especially the word "spasm" is employed to denote local or limited abormal movements, while the term "convulsion" is applied to spasm of a general or universal character.

Spasms, as the word is here used, may affect both kinds of muscular fibres, the voluntary and involuntary, and are of two kinds, clonic and tonic. The first term signifies that the contraction is persistent, as in tetanus; the latter, that it is intermittent, as in chorea.

By local spasm we understand that only a limited number of muscles are affected and that there is no evidence of a central origin.

Beginning with the head, we may meet with cases of spasm of the ocular muscles, dependent upon irritation of the third, fourth, or sixth nerves, and producing lagophthalmus, nystagmus, and strabismus. But these disorders may also have a central origin.

TRISMUS OR LOCKJAW.—*Synonym*: Masticatory spasm.—In masticatory spasm the affection is limited to the muscles supplied by the motor division of the fifth nerve, that is, the region of the muscles of mastication, including the masseters, the temporals, and the pterygoids.

The spasm may be either tonic or clonic, and it is, as a rule, bilateral. It is not a common affection but may be very persistent, and constitutes one of the most constant and alarming symptoms in tetanus.

In the *tonic* variety the contraction of the muscles of mastication is so great that the lower jaw is powerfully approximated to the upper, and the teeth are firmly clenched, forming the condition known as lockjaw. The muscles of the jaw are so tense and rigid that the teeth cannot be separated, and food can only be introduced into the mouth, if at all, through the openings between the teeth. Sometimes severe pain is felt, but not always.

In the *clonic* form the lower jaw is moved backwards and forwards, either horizontally or vertically, producing in the one case a grinding, and in the other a chattering, of the teeth. The first symptom is also seen in children as a reflex result of the presence of worms in the intestinal canal or from the irritative processes of dentition.

As accompanying symptoms there are neuralgic pains in the trigeminus, toothache, cerebral disturbance, etc. The sequelæ are such as biting of the tongue and lips, ulcerations and inflammations of the gums, and inanition.

Bilateral masticatory spasm is often a symptom of tetanus, epilepsy, eclampsia, chorea, and hysteria. It often results from peripheral irritation, from catching cold, etc. Injury to the thumb or the palm of the hand has been a frequent cause since the introduction of the toy-pistol with its fulminating cartridge.

The use of electricity, both in the galvanic and faradic form, has been recommended by way of treatment.

For remedies Arnica, Belladonna, Hyoscyamus, Nux vomica, and Rhus tox. will be most frequently indicated.

SPASM OF THE FACIAL MUSCLES.—*Synonyms*: Facial spasm, Histrionic spasm of the face, Convulsive tic, Mimic or mimetic spasm of the face.

By the term facial spasm we understand a local affection confined to the muscles supplied by one of the seventh pair of nerves or by one of its branches. It may result from irritation of the nerve in the brain, from reflex irritation, or from causes acting upon the peripheral course of the nerve. In rare cases it seems to be inherited. Rosenthal speaks of a family in which the mother, son, daughter, and two other relatives on the maternal side were sufferers from this disease.

The principal exciting causes are catching cold, and reflex irritation of any kind; in many cases it is impossible to satisfactorily ascertain the cause.

The spasms may be either clonic or tonic, the former being by far the more common. In the clonic form, the muscles of the face, generally on one side, are suddenly and violently contracted, and as suddenly relaxed. The paroxysm continues from a few seconds to a few minutes, and is succeeded after a short interval of rest by another. Dr. Hammond says that he has seen a paroxysm lasting an hour. The spasm is excited by emotional disturbance of any kind, by muscular exertion, or a current of air. The paroxysms generally cease during sleep, but not always, and the spasm can sometimes be arrested by pressure upon the facial nerve at various points.

During the paroxysm one-half the face is at perfect rest, so that its contrast with the affected side is very striking. The contortions and grimaces of this latter are extremely varied: winking of the eyes, wrinkling of the forehead, contractions of the muscles of the nose, drawing-up of the angle of the mouth, and movements resembling those of laughter follow in quick succession and in every possible combination; these gradually grow less, the whole expression of the face becomes quieter, a few twitches occur, and an interval of repose follows.

The muscles are not all equally affected in different instances; generally the force of the spasm is expended upon a few muscles. When the palpebral twigs alone are attacked, the affection manifests itself by a rapid winking, called *nictitating spasm;* when the molar and labial branches are implicated, a peculiar convulsive grin, resembling laughing, is caused, to which the terms *sardonic laugh*, *risus caninus*, or *cynic spasm*, are applied.

The convulsive action spreads to the adjacent muscular regions, and may affect the muscles of the neck, shoulder, and even of the arms, and occasionally extends to the other side of the face. Speaking of the association of spasm of the muscles of the face and neck, Sir Charles Bell remarks: "Then we see the head suddenly twitched sideways at the same moment that the mouth is drawn aside. This is a great deformity; for while the individual is animated and speaking with exertion, he gives those sudden startling motions, opening his mouth and turning it to his shoulder, as if he were catching flies."

Tinnitus aurium is sometimes present, but pain is almost always absent in this form of spasm, and any numbness or slight pain occasionally met with is merely accidental.

The *tonic form* of facial spasm was first described by Marshall Hall in 1861, and it differs essentially from the clonic form. The half of the face affected exhibits a peculiar rigidity; it remains at rest during mimetic movements; the furrows are deeper; the face is slightly drawn towards the affected side; the angle of the mouth is distorted; the fissure of the lids is smaller, and the eyebrow is drawn upwards; mastication is rendered difficult upon the affected side in consequence of the deficient mobility of the cheek; a disagreeable sensation of tension is experienced in the muscles affected, the fixed and stiffened condition of which is only interrupted occasionally by sudden twitchings of one or several muscles. (Erb.)

Blepharospasm is one of the partial forms of facial spasm, and consists of a *tonic* contraction of the orbicularis palpebrarum, which generally lasts from a few minutes to a few hours, but may extend over weeks and months. It is sometimes accompanied by photophobia and neuralgia.

The remedies most frequently indicated are Aconite, Arnica, Belladonna, Gelsemium, Hyoscyamus, Ignatia, Mercurius, Nux vomica, and Zincum met.

Sometimes so-called *pressure-points* are present, which are capable of inhibiting the spasm. Strong pressure upon these points, which should be carefully distinguished from the "painful points" of Valleix, seems to control the spasm for a longer or shorter time. Sometimes these points are easily discovered by the patient himself; in other cases they are found in unsuspected parts of the body. Most frequently they are situated along the course of the trigeminal nerve and over the infra-orbital foramen.

The disease has a tendency to become chronic, and perfect recovery from it is rare.

SPASM OF THE STERNO-MASTOID.—*Synonyms*: Torticollis, Wry-neck, Spasmodic wry-neck, Spasm in the region of the external branch of the spinal accessory.

This is defined by Reynolds as a spasmodic condition of the muscles of the neck—generally clonic, but rarely tonic—whereby the head is displaced to one side, or towards one shoulder, or is thrown backwards; occurring almost exclusively in adult life, and characterized by great obstinacy and chronicity. Hammond, however, states that the tonic form is much the more common, and it is to it that the term torticollis is especially applied.

The causes in many instances are very obscure, but catching cold, getting wet, the sudden checking of perspiration, and various reflex irritations are the best known. It also appears as a symptom in some diseases of the central nervous system. It may appear suddenly in a single night and without any discoverable cause, but usually its onset is insidious and gradual.

The sterno-cleido-mastoid, the trapezius, the rhomboid, and the levator anguli scapulæ, each or all, may be affected, and the peculiar movements will of course depend upon the seat and extent of the spasm.

In the *tonic form* the sterno-mastoid is almost exclusively affected, and the contraction, in the early stage of the disease, is accompanied by sharp pain. The head is rotated so that the occiput is brought near the shoulder of the affected side; the ear is drawn towards the clavicle, and the chin is directed upwards and towards the opposite side. The muscle forms a strongly-marked hard projection. This is the so-called wry-neck (Caput obstipum spasticum). In chronic cases the muscles of the neck on the side from which the head is turned are found to be hard and hypertrophied, while on the other side there is a tendency to atrophy.

In some cases the trapezius is also affected, or it may alone be the seat of the spasm; the head is then drawn strongly backwards and towards the affected side; there is no turning of the chin; the shoulder is somewhat raised, and the scapula drawn inwards.

Torticollis or spasmodic wry-neck should be distinguished from the rheumatic affection also called wry-neck and stiff-neck, which is caused by exposure to cold or a draught. In the latter trouble the head is kept in one position, not from contraction of the muscles, but from dread of the pain experienced on moving.

The *clonic form* may affect one or both sides of the neck. It begins with a feeling of uneasiness or discomfort about the neck. Soon it is noticed that the head is not straight, and there is more or less pain of a dull aching character along the course of the muscle. The movements of the head, which are of a rotatory and paroxysmal nature, vary according to the muscles affected, but in the usual variety, with unilateral affection of the sterno-cleido mastoid, the head is rotated obliquely to one side by a succession of jerks in such a manner that the occiput is turned towards the shoulder and depressed, while the chin is elevated in the opposite direction. These contractions occur in paroxysms of variable duration, and sometimes are so violent as to make the patient's life miserable, especially in those instances, which are fortunately the exception, where the spasm continues during sleep. This clonic form is called *tic rotatoire* by the French.

Reynolds says that "observed casually, a case of medium severity would give the impression to a bystander that the patient's cravat was uncomfortable, and that he was trying to make it less so by moving the head, in a somewhat restless manner, towards one side; or that he was making some attempt to look at an object on one side of him, which object he could not get his head round sufficiently far to see conveniently. Upon more careful examination it is seen that the head is constantly being moved, by a succession of jerks, in such manner that the occiput is depressed, and the chin raised, and that the movement is in a definite direction, hour after hour, and month after month."

The prognosis of a fully developed case is unfavorable so far as recovery is concerned, but it may continue for many years without growing worse. Electricity and nerve-stretching have alike proved useless. In the early stages Belladonna, Bryonia, Nux vomica, Rhus tox., and Cuprum may be of use.

PERIPHERAL PARALYSIS.

Synonyms.—Local paralysis, Neural paralysis.

Definition.—Peripheral paralysis is that variety in which the interference with the transmission of nerve-force is due to some lesion which is operative between the exit of the nerves from the nerve-centres, and their termination in the muscular fibres. (Putzel.)

Paralysis, or loss of the power of motion, may be due to disease in the spinal centres or at the origin of the nerve, and also to some lesion of the nerve itself along its course or at its periphery. In the latter form of peripheral or local paralysis the symptoms and extent of impaired power will vary according to the situation and function of the nerve or part of nerve affected.

Peripheral paralysis is due to various causes, such as injury, traumatism, inflammation, rheumatism, heat, cold, poisoning, etc.

In the present article I propose only to speak of a few of the more common and important varieties of local palsy.

FACIAL PARALYSIS.

Synonyms. — Paralysis of the seventh nerve, Bell's paralysis, Histrionic paralysis.

Paralysis of the facial nerve was first thoroughly investigated by Sir Charles Bell, hence one of the names by which it is known. It may be unilateral or bilateral; the former is quite common, and is due to some peripheral lesion; the latter form is rare, and is the result of some central trouble.

The superficial position of this nerve exposes it to various traumatic influences, while its course through a long and narrow bony canal, and its proximity to organs very liable to be diseased, afford numerous opportunities for the occurrence of various lesions of the nerve, and render it peculiarly liable to become secondarily implicated; and since the nerve affected, the portio dura of the seventh pair, is the great motor nerve of the face and plays an important part in facial expression, its paralysis causes much disfigurement as well as discomfort.

Ætiology.—Exposure of the face to cold and dampness is the most frequent cause, especially of that form of the disease in which the lesion is external to the temporal bone. Here the paralysis is probably due to a slight neuritis, followed by serous or plastic exudation into the sheath of the nerve, which compresses the nerve-fibres. It is also caused by lying upon the damp ground, sitting or riding in a current of cold air, and sleeping with the arm pressed upon any hard substance. It is frequently the result of injury, as from blows, gunshot wounds, and fracture of the temporal bone. Swollen and inflamed glands, tumors, hæmorrhages, and inflammatory exudations are all causes of facial paralysis, generally from the pressure which they exert. Within the temporal bone, facial paralysis may result from periostitis, caries, disease of the middle ear, and hæmorrhage.

Neither age nor sex seems to exert any influence in the production of this disease.

Symptoms.—When facial paralysis results from disease affecting the nerve only secondarily, as by compression, it is produced slowly and gradually, and spreads from branch to branch. Generally, however, its onset is more rapid. The patient, after riding, perhaps in the wind, is surprised to find on waking in the morning that his face feels strangely, and that there is difficulty in talking. Upon looking in the glass he sees that his face is twisted all out of shape and his appearance is absurd to the last degree, the healthy side being drawn up, while the other is motionless. The paralyzed side of the face loses its wrinkles and furrows, and appears smooth, flaccid, and expressionless, and in the passive state the muscles appear to sag heavily downwards. The mouth is drawn obliquely to the sound side, one angle of the mouth being drawn up, while the opposite one falls, and the furrow at the angle of the nose is more marked than natural. This distortion becomes very marked during all such movements as speaking, laughing, and crying, giving the appearance as though one were making grimaces. "Paralysis of the buccinator causes the cheek to puff out in speaking and during other expiratory actions; the pronunciation of the labial consonants is impaired; attempts at blowing or whistling fail, the air escaping through the paralyzed fissure of the lips; the saliva dribbles from the affected side; and food is apt to accumulate between the inner surface of the cheek and the teeth." (Ross.)

He cannot wrinkle his forehead nor close his eyes, from paralysis of the orbicularis palpebrarum and corrugator supercilii, and when he attempts to do so, the eyeball rolls upwards and generally inwards; at the same time, the levator palpebrarum, which is not supplied by the facial, but by the third nerve, contracts and keeps the upper eyelid open. As a result, dust and other foreign substances collect, causing irritation and discomfort. Owing to paralysis of Horner's muscle, the tears cannot enter the lachrymal canal, and hence flow over the cheek. Both winking and the perfect closure of the eyes during sleep are impossible. This unpleasant symptom may be temporarily palliated by closing the eye with the finger, or by keeping the lids together by adhesive plaster. Sight is unimpaired, except as injured by the exposure and irritation.

If the lesion of the nerve is situated above the geniculate ganglion, a much more extensive paralysis may result, as shown by a loss of power of the muscles of the palate and uvula. When the patient opens his mouth, the soft palate on the side corresponding to the facial paralysis is seen to hang loosely down, and its edge is straight instead of curved. The uvula is also distorted, being pulled toward the sound side by the action of the tensor palati.

If the lesion is above the point where the little branch to the stapedius muscle is given off, the hearing is rendered more acute. Roux, speaking of an attack from which he himself suffered, mentions a painful vibration of the tympanic membrane on the affected side for moderately strong sounds. Ross considers that this acuteness of hearing is due to tenseness of the membrana tympani from over-action of the tensor tympani resulting from paralysis of the stapedius, but Brown-Séquard attributes it to hyperæsthesia of the acoustic nerve from vaso-motor spasm. Dr. C. P. Hart says that the hearing may be diminished or rendered more acute, according to the nature of the lesion, pressure interrupting, and inflammation and irritation exciting, its function. Another explanation of the partial or total deafness sometimes observed, is that "the auditory and facial nerves may be simultaneously affected by diseases at the base of the brain, in the meatus auditorius internus, or in the middle ear, and the adjoining parts of the temporal bone. When this is the case, the facial paralysis is accompanied by deafness of the ear on the affected side." (Ross.)

If the lesion of the facial nerve is situated anywhere between the geniculate ganglion and the point of origin of the chorda tympani from the facial the patient will experience a diminution, but not a complete abolition, of the sense of taste upon the corresponding side of the tongue. This consists in a lessening of the sense of taste for acid, sweet, or saline substances. When the secretory fibres of the chorda tympani are affected, a marked dryness of the mouth is produced.

When the tongue is protruded, it sometimes appears to deviate to one side; this is due to the distortion of the mouth.

Bifacial paralysis is quite rare. Hammond states that he has seen but one case, and none have come under my observation. Both sides are affected nearly, or quite, simultaneously, and the face appears as though it were a mask, being almost expressionless. The disease is usually caused by some pressure, as of a tumor located at the base of the cranium—or is found in connection with progressive bulbar paralysis. Romberg thus describes a case: "In a girl of sixteen, in Dupuytren's Clinique, there was no distortion, but a pendulousness and entire absence of motion was perceptible in all the features. The eyelids only closed half, the lips stood apart, and played backwards and forwards from the impulse of respiration. The expressive countenance bore a serious character, which contrasted forcibly with the patient's frame of mind. She was heard to laugh aloud, but the laugh seemed to come from behind a mask."

The **Pathology** of this disease has received sufficient attention in the sections describing the causes and symptoms.

Diagnosis.—The only two conditions for which facial paralysis can possibly be mistaken are glosso-labio-pharyngeal paralysis and the paralysis of the face resulting from cerebral hæmorrhage. The history of the case alone will generally be enough to remove any doubt—the paralysis resulting from hæmorrhage is less general so far as the face is concerned, the eye can be closed, and there is usually hemiplegia. From glosso-labio-pharyngeal paralysis it is distinguished by the facts that in that disease the symptoms affect only the lower part of the face, and that they are accompanied by paralysis of the tongue and of the muscles of deglutition.

Erb gives the following diagnostic indications for the *peripheral* form which is by far the most frequent: Implication of all the external branches of the nerve; lagophthalmus, especially during sleep; atrophy of the paralyzed muscles (in long-lasting cases); absence of reflex and associated movements; the presence of external wounds or other injury in the vicinity of the nerve; disease of the organs adjoining the peripheral part of the nerve, as of the parotid gland, the internal ear, or the temporal bone; implication of other nerves at the base of the brain; and absence of characteristic symptoms.

Prognosis.—The prognosis is generally favorable, but depends greatly upon the nature and seat of the lesion. In recent cases due to cold, to rheumatic effusion, to pressure, or any removable cause, the paralysis will disappear in a few days or weeks under proper treatment. The most unfavorable cases are those due to infra-cranial lesion, to injuries of the bone, tumors, caries, and other obstinate or incurable disease. When caused by syphilis, the prognosis is favorable, though it is not always curable. If the paralysis has lasted for some time, and contractions have begun from muscular atrophy, recovery is very doubtful, the more so if electric contractility is lost.

Treatment.—The first indication is to remove the cause, when possible. This may often be done if the paralysis is caused by any injury, tumor, or is of such a nature as to be amenable to surgical treatment. Any rheumatic or syphilitic complications should be carefully remedied. All observers agree as to the efficiency of electricity in this affection. When there is neuritis, the galvanic current may be applied at an early period, the best method being the stabile application of the positive pole (anode) to the mastoid process of the affected side, the negative pole (cathode) being placed on the opposite side. Dr. Hammond advises the use of the induced current if it will cause the muscles to contract, otherwise the primary interrupted current should be tried, care being taken not to employ a current of too great a degree of intensity.

Dr. Detmold has devised an apparatus which aids treatment in some cases by supporting the muscles of the paralyzed side. It consists of a piece of tin or silver wire bent into a hook at one end, for the angle of the mouth, and then bent again at the other end and passed over the ear, or kept in place by an elastic band.

Therapeutics.—**Aconite** is useful in acute cases caused by riding in cold dry winds; the face is hot and tingling; acute neuritis; in many cases this will be the only remedy required.

Arnica.—Paralysis caused by injury or by pressure, as from lying on the arm; soreness of the face and of the muscles of the neck; result of a blow.

Belladonna.—Acute cases, attended with inflammation of the nerve, redness of the face, hyperæsthesia, throbbing and extension of the inflammation from the surrounding parts, as from the tonsils and parotid glands. Often caused by exposure to cold damp winds and weather. Right side of the face especially.

Causticum.—Inclination to close the eyes; heaviness of the lids, but eyes cannot be kept closed; eyes inflamed and sensitive; neuralgia of the face and paralysis, especially from cold; distortion of the tongue and mouth when talking; twitching of the lids and eyebrows.

Gelsemium.—Paralysis of the lids; eyelids heavy; difficulty in raising the lids; eyes sore; contraction and twitching of the muscles; face looks heavy and expressionless.

Kali chlor.—Rheumatic paralysis of the facial nerve; pressure and tension in the face; cramp-like drawing in the cheek; stinging pain.

Merc. viv. and **Potassium iodid.** are useful when there is reason to suspect any syphilitic complication or the presence of effusions.

Diphtheritic Paralysis.

Palsies, after certain acute diseases, such as typhoid fever, scarlatina, and variola, have been recognized for a considerable time, but only within a few years has the connection between diphtheria and a special form of paralysis been clearly pointed out. This is owing to the fact that in most cases the paralysis does not immediately follow the diphtheria, but that several weeks or months may elapse between them.

There are two forms of this palsy, one of which, the more severe, is ushered in at once with great constitutional disturbance, there being nephritis, dropsy, œdema of the lungs, general paralysis, uræmic convulsions and delirium, and death takes place in a few days. But in most cases the attack is milder and ends in recovery, unless the patient should accidentally choke by getting a bit of food into the air-passages.

The degree of the paralysis is not proportional to the severity of the primary affection, for it often comes an after an attack so mild that it would have been called simple pharyngitis, were it not for the existence of undoubted cases of diphtheria in the house.

The symptoms indicating nervous disorder occasionally begin towards the close of the febrile stage and before the apparent recovery of the patient, but usually the symptoms develop some weeks after the disappearance of the membrane, and when all signs of pharyngeal inflammation have subsided. As a rule, the paralysis is more severe when it is developed soon after the primary attack.

In the majority of cases the first symptom noticed is paralysis of the velum palati: this is shown by the nasal tone of voice, and by the regurgitation of fluids: articulation, especially of the explosive consonants, becomes difficult or impossible. On examining the back of the throat the soft palate appears flabby and drooping, and when the tongue is depressed the palate is seen to have lost its reflex excitability, it is not retracted during phonation, deep inspiration, or even deglutition. It may be pricked, touched, or even cauterized without showing signs of reflex action. It is easier to swallow solids than liquids, because the latter are apt to be ejected through the nose; but at a later stage, when the pharynx is paralyzed, deglutition of solids becomes equally difficult, and there is danger of starvation from inability to swallow sufficient food, and danger of being choked by the food entering the glottis. The tongue is rarely affected, but sometimes is more or less paralyzed, and trembles when protruded, which is done with difficulty. The voice may be altered from a slight degree of hoarseness up to complete aphonia from paralysis of the muscles, which render tense and approximate the vocal cords.

The motor nerves of the eye are often affected. Paralysis of the ciliary nerve is shown by loss of the power of accommodation, so that distant objects are seen distinctly, while the patient cannot read or see near objects clearly. Ptosis, strabismus, diplopia, and amaurosis may also be present. Real facial paralysis is not often present, though Rosenthal reports its occurrence, and Wilks says that "the patient becomes utterly helpless, quite incapable of standing or moving the arms, the face loses its expression, the saliva runs from the mouth, there is thickness of articulation and difficulty of swallowing; in fact, the patient has the appearance of an idiot, and more especially so if he be not completely paralyzed and is able to walk, for then he stumbles along, and with his head hanging forwards, and his vacant stare, looks like an imbecile."

In most cases paralysis of the muscles of the limbs and trunk is present. [illegible] states that it is rarely observed except in cases in which the velum palati had been affected, and usually develops after the latter begins to improve, or even after the faucial disorder has entirely disappeared. Usually the lower limbs are first attacked, and afterwards the upper and the trunk, so that the patient experiences great difficulty in standing or in walking. The motor disorder may simply amount to a certain degree of feebleness of the limbs which manifests itself in an uncertain and staggering gait. The patient may seem to have sufficient strength to walk, but he has lost control of his limbs, and there is a want of coordination. The difficulty in walking is increased by the sensory disturbances alluded to later. After a time the paralysis increases in intensity and extent, and the feebleness may become so great as to compel the patient to remain in bed.

At the same time the dynamometer shows diminished grasping power of the hands. The patient finds it difficult to button his clothes or to carry a spoon to his mouth, and the difficulty of seizing small objects is greatly increased by the presence of sensory disorders. The neck too is so affected that the head tumbles about upon the pillow from an inability on the part of the patient to support it. Dyspnœa and accelerated respiration are sometimes caused by affection of the diaphragm, and the pulse is much diminished in frequency. Paralysis of the heart's action sometimes occurs, and produces sudden death; in other "cases the cardiac disturbance is shown by an excessively slow, irregular, and feeble pulse, and by paroxysms of palpitation, together with præcordial anxiety and dyspnœa." (Ross.)

Disorders of sensibility are of frequent occurrence. The gums may be so anæsthetic as not to be aware of the presence of food in the mouth; Sauné states that anæsthesia of the upper portion of the larynx is frequent; this is shown by a short abrupt cough, which occurs during deglutition and is caused by particles of food finding their way through the glottis. The anæsthetic condition of the hands gives rise to the "pins and needles" sensation, and a feeling as if the hands were covered with gloves, together with a sensation as though the palmar tips of the fingers were very dry, as after handling salt; the ability to distinguish weight and temperature is greatly diminished, and it may be difficult for the patient to grasp small objects firmly, especially when the eyes are closed. The same disturbances attend attempts at walking. Often the patient cannot feel the ground at all, or he has the sensation that he is walking on cotton or some soft substance; and walking with the eyes closed is nearly as difficult as in locomotor ataxia.

Pathology and Pathological Anatomy.—Since there are many conflicting theories as to the nature of diphtheria, it naturally follows that there are many opinions as to the cause of the paralysis. Andral, Sauné and Dowse call attention to the blood changes in the disease, and show that there is a marked relation between the amount of albumin in the urine and the paralysis. Dr. Hamilton thinks that the paralysis of the palate and muscles of the pharynx are the result of pressure made by the diphtheritic membrane, but this does not seem reasonable, nor does it account for the general paralytic symptoms. Dr. Ross says that clinically this form of paralysis is similar to progressive multiple neuritis, and he thinks the anatomical substratum of both affections is a parenchymatous inflammation of the peripheral nerves. Dr. Hart thinks that two facts are pretty well established, 1st, that the phenomena are due to parenchymatous and interstitial changes in the gray substance of the cord, and that these changes are of an inflammatory nature; 2d, that secondary changes exist in the anterior or motor nerve roots, but not in the posterior or sensory roots. Other investigators report cases where spinal cord, medulla oblongata, and anterior and posterior roots were normal. Hence it seems that our present knowledge is not definite enough to enable us to speak positively upon this point.

Diagnosis and Prognosis.—As a rule, the diagnosis will present no difficulty, the previous existence of a sore throat being enough to guide us. There may be doubt in those cases where the sore throat was very slight. The paralysis terminates in complete recovery or death, and only very exceptional cases are reported in which the recovery was incomplete. It is estimated that about ten per cent. prove fatal under allopathic care.

Treatment.—Our main endeavor should be to build up the system by the use of a good generous diet, plenty of fresh air, and moderate exercise. In this disease it seems well to allow a moderate amount of pure native wine, such as Angelica or Catawba; the stronger alcoholic liquors are injurious. I have seen but little good result from the use of electricity in any form.

The remedies which are most valuable in the treatment of diphtheria will also be the most useful here; and often a history of the primary attack will aid in selecting the right remedy for the paralysis.

The remedies most frequently indicated are Apis, Belladonna, Lachesis, Mercurius, Nux vomica, and Rhus tox.

INFANTILE SPINAL PARALYSIS.

Synonyms.—Paralysie essentielle de l'enfance, Paralysie myogénique, Paralysie atrophique de l'enfance, Spinale Kinderlähmung, Poliomyelitis anterior acuta, Antero-spinal paralysis of infancy.

Definition.—A disease of the spinal cord occurring in young children, and marked by the three successive stages of fever, paralysis of the muscles, and atrophy.

Ætiology.—The causation of this disease is very obscure. Erb, in Von Ziemssen's Cyclopædia, devotes several pages to an enumeration of the many causes which have *not* any connection with the disease. Neither hereditary predisposition, dentition, nor sex exerts any perceptible influence. Temperature may have some influence, as Wharton Sinkler states that out of 57 cases, 40 occurred between May and October. Dr. Hammond says that in two instances it was apparently caused by the nurse allowing the infant to lie on the damp ground for an hour or two, but that in the great majority of his cases no cause could be assigned. Dr. Hamilton thinks that more of these patients belong to the lower walks of life than to the higher, and that the children of the destitute poor, who come of drunken parents and are poorly nourished, are generally the victims of the disease. Dr. Hart stands alone in saying that "in the majority of cases it is found to follow violent attacks of dysentery and cholera infantum." As to age, Sinkler states that 84 out of 108 cases were between the ages of six months and three years, and that half of this number were males. Of 56 cases occurring in the practice of Duchenne among children up to ten years of age, 49 occurred during the first two years of life.

Symptoms.—There are three distinct stages in the course of infantile spinal paralysis. The febrile, the paralytic, and that of atrophy with resulting deformity. Dr. Ross follows Laborde and divides it into four periods: 1, Invasion; 2, remission; 3, regression of paralytic phenomena; 4 atrophy and deformities.

The first symptom to be noticed is fever; this is attended with restlessness, drowsiness, a hot skin and a feeling of malaise, and is ascribed to dentition, to taking cold, or slight indigestion that may be present. The fever may last from a few hours to several days, may be severe or so light as hardly to be noticed. When the fever is severe, there may be marked cerebral symptoms, somnolency, startings, and even delirium. In most cases there is pain in the back, which, Hammond says, marks the seat of the disease in the spinal cord to which the paralysis of the muscles is due. Convulsions are often present; according to Duchenne, in about half the cases. The fever and pains in the back and limbs are often attributed to rheumatism, and the child is kept warmly wrapped in bed or in its mother's arms, and in a few days is found to have lost the use of one or more of its limbs. In some instances there is no previous illness noticeable, the child is put to bed apparently well, and found paralyzed in the morning, in which case the paralysis is usually local in its nature, being confined to one limb or a portion of a limb. In other instances the paralysis follows a single convulsion, or a series of them, and then the presence of fever is unnoticed, as the violence of the paroxysms masks all else.

Within a day or two after the cessation of the fever, or of the occurrence of the convulsion, it is suddenly noticed that the child is paralyzed and fails to use its limbs. This paralysis is developed rapidly, but in some cases does not reach its height for several days, and is quite general, affecting all the limbs. Sensibility is unaffected, except some slight hyperæsthesia during the feverish stage. Reflex action is abolished or impaired in proportion to the intensity of the paralysis. While at first the paralysis is quite general, in a short time it shows a tendency to recede from certain muscles and to become fixed in other parts. Dr. Seguin says that the retrocession of the paralysis, its disappearance from some limbs, and fixation upon one or two, or upon unsymmetrical distant muscles, is highly characteristic of the disease. This fixation is usually upon parts of the lower limbs, more seldom upon the upper, and rarely upon parts of the trunk. The muscular group which is most often affected is the anterior tibial and peroneal. The functions of the bladder and rectum are unaffected. Occasionally the paralysis may gradually recede from all the muscles, but as a rule some remain permanently paralyzed.

Dr. Ross says, the chief facts which concern us in this affection are that the paralysis reaches its maximum of extent and intensity at once; that in all cases, without exception, improvement occurs in some of the paralyzed muscles; that the improvement proceeds most actively during the first four to eight weeks, and subsequently at a much slower rate; and that the improvement may continue for from six to nine months, and under appropriate treatment may go on for one or two years from the commencement of the attack.

As a result of the paralysis there is corresponding muscular atrophy and loss of electric contractility. When only a few muscles are affected, the atrophy may cause only slight deformity, such as the shortening of a limb; or if contraction takes place, club-foot in some one of its forms is produced. If the paralysis and atrophy are more extensive, the limb becomes cold and wasted, and hangs helplessly from the body. The temperature of the affected limb will be from five to ten degrees less than that of the healthy one. The shortening of the limb is caused by atrophy of the bone and arrest of its nutrition. Duchenne has shown that the atrophy of the bones has no necessary relation with that of the muscles. The greater part of the muscles may be lost in a limb, while the bones are entirely unaffected; and, on the other hand, a limb may be considerably shortened, while only a few muscles are atrophied. Dr. Ross states that this shortening may proceed so that in a year or two the affected limb may be found from two to six inches shorter than the sound limb. The long bones are thinner than normal; they are porous, friable and yielding; their epiphyses and processes grow smaller and less distinct; the paralyzed hand or foot is shorter, narrower and thinner than the sound one; and even the pelvis may be arrested in its development. In addition to the distortions thus far mentioned, we meet with what Dr. Seguin terms "compensatory deformities," especially in the spinal column; hence the various forms of curvature, scoliosis, kyphosis and lordosis, which are simply attempts to restore disturbed equilibrium.

Pathology and Pathological Anatomy.—Roger and Damaschino give the following as the result of their investigations into three cases of this disease:

1st. The characteristic alteration of infantile paralysis is a lesion of the spinal cord, of which the atrophy of the muscles and nerves is the consequence.

2d. This lesion is more particularly situated in the anterior portion of the gray spinal substance, where it is seen in the form of centres of softening.

3d. This softening is of an inflammatory character, and the disease is a myelitis. The cell alterations consisted in atrophy with pigmentation.

According to Seguin the latest researches demonstrate the existence of several kinds of muscular degeneration in infantile paralysis. The most common is simple atrophy, which almost always affects such muscles as are kept in forced repose for a long period; it manifests itself in a shrinking of the individual muscular fibres; a transverse section reveals the separation of the contractile substance proper from the sarcolemma; moreover, as a rule, we find a fatty infiltration of the cells of the connective tissue. Granular degeneration is a frequent form. In this form proteinaceous granules are found in the fibre itself; the striation disappears gradually, more slowly than in the simple atrophy; here also exists a fatty infiltration of the interstitial tissue.

Dr. Hammond argues in favor of the existence of trophic cells in the spinal cord, and believes them important agents in the destructive processes. He calls attention to the fact that the peripheric disturbance is, in the first place, solely one of motility; there is paralysis without atrophy, which may not come for six months and may commence at once. The trophic changes, in many instances, are not of a mild character, such as would result from disuse, but are active and intense, leading to destruction of whole groups of muscles, and to degeneration of the bones. He considers it impossible to satisfactorily account for such atrophic processes on the supposition that all the cells of the anterior horns of gray matter are motor.

Prognosis.—As has been stated, in some instances the paralysis has a tendency to pass away in a short time without any resulting troubles; but such cases are exceptional. While our prognosis may be favorable so far as danger to life is concerned, we must in the majority of cases anticipate a certain amount of atrophy and deformity in spite of our best efforts. In too many cases the disease has existed for months or years before medical aid is sought; atrophy and deformity have become fixed and extensive, and with the lapse of time, treatment has become of less avail. Dr. Hammond says that "if the muscles can be made to contract with either the induced or primary currents, the cure is merely a matter of time and patience," and Dr. Radcliffe says "if the paralyzed muscles retain their electro-contractility and sensibility, and so show that they have not passed into that state of fatty degeneration into which they always tend to pass eventually, there appears to be scarcely any limit to the time in which improvement, and even recovery, is possible."

My own observations lead to the conclusion that not much improvement is to be looked for after the disease has lasted for a year without treatment.

Treatment.—Arnica, Belladonna, Rhus tox., and Strychnia are the only remedies from whose internal use I have seen any benefit. The use of cold water to the spine, either in the form of a douche or of a compress, tends to relieve the inflammatory condition. Dr. Hart advises the use of Arnicated embrocations in advanced stages, particularly one composed of equal parts of Arnica and Olive oil.

Passive exercise of the affected muscles by kneading; the alternate application of hot and cold water to the spine; friction with a flesh-brush; and immersion of the limb in hot water, all have, at various times, seemed to aid in the treatment.

Electricity is the most valuable agent which we possess for treating this disease, but its use must be persisted in for months or years. Dr. Seguin advised the use of the galvanic current, and placed but little dependence upon the faradic. He says the number of cells to be used must be determined by trial. The positive electrode should be placed upon the nerve-trunk supplying the atrophied group of muscles, and the negative sponge upon various muscles of the group, the current meanwhile being interrupted slowly by removing and replacing the negative electrode.

D. GENERAL NERVOUS DISEASES.

CATALEPSY.

BY SAMUEL WORCESTER, M.D.

Synonyms.—Morbus attonitus, Hysteria cataleptica, Stupor, Ecstasy? Trance?

Definition.—The term catalepsy, derived from the Greek word καταλήψις, meaning a "seizure" or "arrest," is used to describe a somewhat rare neurosis, closely allied to hysteria, and by many authors considered one of the forms of that protean disease. Its characteristic symptoms are attacks occurring in paroxysms, marked by a partial or total loss of sensation, consciousness and voluntary motion, together with stiffness or contraction of the voluntary muscles, so that the affected parts remain for an indefinite time in the position assumed at the beginning of the paroxysms, or in which they may be placed for purposes of experiment, no matter how constrained or unnatural such positions may be.

Ætiology.—The causes are predisposing and occasional. Of the former, heredity is by far the most frequent and important, for although there is no evidence showing that catalepsy is transmitted, it generally occurs in persons of a well-marked neuropathic temperament whose immediate relatives are subject to the kindred neuroses, hysteria, chorea, epilepsy, and insanity.

Strong mental emotion, especially of a depressing character, such as fright, disappointment, anxiety, or chagrin, serves as the usual immediate causes; also intellectual excitement or religious exaltation, especially when there is any morbid psychical susceptibility; and these emotions may be either acute or long-continued. The paroxysms not unfrequently appear as a symptom in cases of melancholia with stupor and, more rarely, in cases of mania.

Other assigned causes are cerebral tumor, masturbation, uterine or ovarian irritation, excessive sexual indulgence, helminthiasis, etc., but these play a very subordinate part.

The disease is more common in early and middle life, and has been noticed as early as the age of five years (Eulenberg). It is found more frequently amongst women than men, owing probably to their greater liability to hysteria, depending upon their more delicate nervous organization.

Pathology.—Since death, as a result of uncomplicated catalepsy, is very rare, we know nothing definite of the pathological changes causing such peculiar and positive symptoms. It seems probable, however, that we have to do with a temporary disturbance of functional activity rather than a structural change sufficiently extensive or gross to be recognized by our usual methods of research.

Many writers teach that the peculiar rigidity is due to an increased tonus of the voluntary muscles, either absolute in its nature or comparative, being dependent upon impaired voluntary control, so that reflex action is increased; but Ross states that a fatal objection to this theory is the fact that in many cases reflex irritability is diminished or abolished, and also that the *flexibilitas cerea* is not accounted for.

My own view, based upon observation of the cataleptic condition so frequently seen in cases of melancholia with stupor, is that the state is closely allied to that of somnambulism. Owing to emotional shock, intense introspection, or some similar cause, the volitional impulses from the cerebral cortex no longer flow into and direct the body to the usual extent. Reflex action and coördination of movement, however, remain unimpaired, as they are under the control of nervous centres situated in the spinal cord and medulla oblongata. This reflex and coördinate action may be nearly normal or greatly exaggerated, according as the inhibitory power residing in the central or basal ganglia is, or is not, destroyed. For, while the will is the principal agent in choosing or hindering the assuming of any position, yet, when its control is withdrawn, the supplementary automatic will, so to speak, residing in the central ganglia may, to a certain extent, take its place.

The waxy flexibility, which is of a reflex nature, may or may not be present.

That the fundamental state here met with is a temporary withdrawal of the will, or its paralysis, is evidenced by a statement made to Esquirol by one of his patients after recovery, viz.: "This want of activity was due to the fact that my sensations were too feeble to call forth an exercise of will," or, in other terms, the patient is unable to exert his will, and feels the impossibility of freeing himself from the mental and physical bonds which hold him fast.

Symptoms and Description.—The attacks of catalepsy occur suddenly, as a rule, but at times there are premonitory symptoms, such as headache or vertigo. At times the patient may be seized while in the middle of a sentence or of a gesture.

The following case, occurring in complication with melancholia, will give a clear idea of an attack.

Mrs. U., æt. 30, having had four children in about six years, was attacked about six months after her last confinement by puerperal mania, which gradually passed into melancholia. Owing in part to unfavorable surroundings which could not be controlled, and in part to strong hereditary predisposition, she has never entirely recovered. Her melancholia has had a well-marked religious cast, she thinking that she cannot be saved, and that she is more wicked and worthless than any one else in the world. About the middle of August, 1880, her husband informed me that she was not quite as well as she had been, and I made several visits trying to persuade her that it was right for her to take some enjoyment in life and try to be more happy. The Essex Institute was to make an excursion to the mountains and into Canada, and the husband, who was much worn by the mental strain of the past year, desired to be of the party, and was anxious to take his wife, hoping that the change of scene and air would do her good; she, however, refused to go, but consented to have him take the trip, though reluctant to have him away from her. The party went on Wednesday, August 18th, and on the following Sunday I called and found her much as usual, though perhaps a little more depressed; still, she was surrounded by her children and playing with them. Her mother and aunt were staying in the house during the husband's absence. They told me that Mrs. U. had refused to go to ride, as I had advised, *because she had not been alone with them before*, one of her peculiarities being a strong repugnance to doing anything, eating anything, or wearing anything for the first time since her illness. I, too, tried to induce her to go to ride, but in vain.

Early Tuesday morning, about half past three, I was sent for, as she was said to be in a trance, and I reached the house about four. She was in the habit of sleeping in a front room, and the nursery where her children slept opened from it. Monday night her mother urged to be allowed to sleep with her, but she refused, saying that she had not been in the habit of so doing, and that if her husband had wished it he would have said something about it, but that if she needed anything in the night she would call. About two o'clock in the morning the mother and aunt were awakened by the crying of one of the children, and, going into the nursery, found Mrs. U. standing in her night-dress in the middle of the floor; there was a look about her face as if she were peering into vacancy, and an expression as if listening with horror to some dreadful news and waiting to hear more; her finger was raised in the attitude of bidding one hush and listen. All the efforts on the part of her relatives failed to gain any notice or recognition, and I was sent for. On my arrival, two hours later, her position was literally unchanged; once only it seemed for a moment as though she would fall, but she quickly resumed her position.

I found her in the position above described; limbs rigid and features fixed. All appeals to her feelings or her reason elicited no response; it was like speaking to a statue, so I sat down and waited for developments.

The mother now put in an appearance and, clinging to the patient, tried to get her to bed, using tears, entreaties, and threats, but all in vain; finally she tried pulling, when suddenly the patient gave her a sound box on the ear, and at once resumed her former attitude and stolid and anxious gaze. About six o'clock I placed an armchair behind her and drew her down into it, but she kept her legs almost straight, and her arms folded across her breast. All attempts to induce her to swallow were useless, as she kept her mouth tightly closed. From time to time I placed her leg, arm, or finger in a constrained and awkward position, using some force to overcome the resistance of her muscles, but the limb would retain its awkward position until I again moved it. She, in the meantime, took no notice of anything; but once in awhile she would look at us with an expression of unutterable horror and grief. This state of things continued at 8.30, when I left the house. In the evening I found that she had, to a limited extent, emerged from her condition, but remained speechless and refused to take food. Thursday her condition seemed more like intense melancholia, but there was still great rigidity of all the muscles. The temperature was a little below the normal point, pulse natural. The patient was menstruating at the time of the attack, although only two weeks had elapsed since her last period.

As a rule, the cataleptic attack occurs suddenly, but there may be certain premonitory symptoms, such as drowsiness, lassitude, headache, impairment of memory, frequent sighing, flushing or pallor of the face, transient cramps in the limbs, loquacity and irritability. Sometimes the patient stops suddenly in the middle of a sentence or of a motion with open mouth or raised arm, as the sudden stiffness seizes the muscle. In complete catalepsy, *le grand mal cataleptique*, this peculiar condition of stiffness, or rather of extreme muscular tension, extends over all the voluntary muscles, though not in equal intensity. The affected muscles have a firm feeling and offer a certain resistance to passive motion. This resistance usually diminishes and is succeeded by the *wax-like* condition; the muscles, though still contracted and firm, yield to passive motion, so that the limbs, when placed in any position, however awkward or unnatural, will retain it for some time. This phenomenon can be seen much better in the upper than in the lower extremities, and in the small than in the large joints; for example, in a hand or finger rather than in the elbow or shoulder joint. This condition does not last in its full intensity as long as some would suppose; as a rule, after some moments, there is a diminution of the stiffness, so that the limbs obey the law of gravity, and the arm raised horizontally sinks a little.

There is at the same time loss of consciousness of all external impressions. In some cases the patient may move when touched or pinched, or in rare cases he may seem to recognize persons and intelligently answer questions, but on emerging from the attack there is no recollection of such occurrences.

The general vital functions undergo no marked change during the attack. The respiration is of normal frequency, the heart beats regularly, and digestion is unimpaired.

In the milder and incomplete form of the disorder, *le petit mal cataleptique*, the mental functions are not entirely abolished, but are weakened and confused. Patients will retain a vague recollection of what has occurred, and during the paroxysm a certain degree of intellectual and emotional activity may be manifested by them. A patient observed by Favrot said that during the attack it would have been impossible for him to move, even though threatened with a blow from a red-hot iron, but that he was conscious of everything.

The following case seemed to be complicated with hysteria: On the afternoon of October 16, 1873, I was called in haste to see Miss Clara W., aged about 18, of an hysterical temperament. I found her lying upon the bed, perfectly unconscious, and was told that she had been ailing for a day or two from some menstrual irregularity, that she had not slept well the previous night, had eaten no breakfast and but little dinner, and had complained of headache all day. In the afternoon, while sitting with her friends and talking, she suddenly, without apparent cause, lost consciousness and became motionless, but did not fall from her chair. Having been placed on the bed, I was sent for. Her pulse was slower than normal, but perfectly regular. Temperature in the axilla 98°. Respiration was somewhat irregular and of a sighing character, there being several light inspirations followed by a deeper one; sensibility of the skin seemed diminished, as no signs of pain were noticed on pinching or pricking the skin. The pupils were insensible to light, and no response was made to any sounds. If the arms or legs were placed in awkward positions they remained so for a time, gradually falling by their own weight. This condition remained unchanged for about four hours, when the patient suddenly regained consciousness without, however, any accompanying hysterical symptoms. She said that she knew nothing of what had taken place.

The following case with puerperal complications is reported by Professor Raue, of Philadelphia. Mrs. T., aged twenty-nine, married, of nervous temperament, gave birth to her first child at "term," November 12th, 1870, the whole labor being accomplished in about six hours. Very soon after, she was attacked with severe pain in the left side of the head, chiefly in the orbital region.

In about four hours, she had her soiled clothing removed, her bed fixed, etc. This fatigued her much, and greatly increased the pain in the eye and head. In about five hours after this, she became entirely blind, and ceased to be *conscious* of pain. She says she does not know whether she slept or not, but she is certain she was not fully conscious. Twenty-two hours after labor, she was suddenly seized with a convulsion. During the next four days she remained unconscious of surrounding events, according to her recollection, although she would do many things, such as handle the baby, and let it nurse, and even talked.

Consciousness returned suddenly like an awakening from sleep. While in this state of semi-consciousness, she says it appeared as if there were a panorama constantly passing before her, so that she was excessively wearied by it. After waking, everything that was of a light color appeared to be covered with minute black spots about one quarter of an inch apart. This disordered visual condition lasted for three or four days, and then gradually left her.

Immediately after her return to entire consciousness, she became greatly depressed in spirits, unutterably sad, felt that she would die in despair, etc.; the whole world was dark, had a feeling of weight at her heart, felt that she had disgraced herself by having a baby, etc.

The presence and conversation of her husband, the nurse, and others, would lighten this feeling a little, but it would return with full force whenever she awoke from sleep. This mental condition did not improve for about six weeks. The bowels were not evacuated for about twelve days after parturition. When the baby was three weeks old the lochia ceased. Soon after this, while lying on the lounge one day, she was suddenly taken with a new sensation at, or about, the heart. She says it was indescribable, but fearfully intense. She called out for help, but did not move or lose consciousness; her face became of a leaden hue; the saliva thickened, and she had a peculiar sensation at the root of the tongue. The paroxysm lasted about two or three minutes, then gradually passed off with a sigh, leaving her exhausted and wearied.

This kind of paroxysm became of frequent occurrence, of greater intensity and longer duration. They came suddenly, under every circumstance of position, occupation, or surrounding; at table, when sitting at her work, when engaged in amusement, when walking the street, and when asleep. Sometimes there would be several in a day. This condition lasted until her babe was three months old.

She says it required much mental effort to keep her from committing suicide, and that she has frequently bitten herself as a kind of relief from her feeling of desperation. She relates that on one occasion one of these "spells" came over her as she was walking on the street; on seeing a man, a feeling came over her (that she resisted with difficulty) to spring at him and tear him to pieces.

She felt that she was going insane; but after her child was three months old, the "spells" became less frequent, returning with some degree of periodicity, about the middle of the month, lasting for a day, during which she would have several, to be followed by a sense of mental depression for about three days, occupying in all about the time of a menstrual epoch. This lasted about six months. Then, without any change in the character of the "spell," they began to come irregularly, and she was led to believe that on the return of menstruation she would be free from this awful condition.

Her menses became regular and normal, but the only relief she experienced was a slight abatement in the severity of the paroxysm, which still came on at irregular intervals and in different degrees of intensity; but what they lost in intensity they made up in frequency.

At this time her babe is nineteen months old. The duration of a paroxysm, that is "the spell" itself and its immediate effects, will pass over in about fifteen minutes, and she will be quite herself again. Dr. Raue assumed charge when the child was eighteen months old. Although under a constant dread of insanity, and consequently low-spirited, she never weeps. She says "the spells," when they come on, cause a kind of mental terror at the time; she wants some one near her, but not to touch her; says she knows everything that goes on about her, but cannot move, and thinks she does not wink, but keeps her eyes open and immovably fixed. The spell passes off with a sigh. She refers the sensation to the præcordia; says there is a weight of sadness there that is terrible; the feeling is not pain but emotional; says she believes she has them without waking from sleep.

In the above case, Dr. Raue prescribed Cocculus indica for the following symptoms: "anxiety;" "anguish about the heart;" "anguish of death;" "frightful anguish, seeming like a dream, during sleep;"

"stupid feeling in the head;" "thinking fatigues the head;" "headache as though the eyes would be torn out." All these symptoms were present at the commencement of the illness, and the Cocculus cured the case in a few months.

Diagnosis, Prognosis, and Treatment.—In many cases it is extremely difficult to distinguish between pure cataleptic attacks and the kindred states known as trance, hypnotism, ecstasy, and hysterical unconsciousness; and but little practical benefit is to be gained by so doing; these various conditions just named seem mutually dependent, and one may pass into the other.

The course of the disease is usually chronic, continuing at intervals through life. Some persons may have but one or two attacks, especially when the exciting cause is some violent mental shock, and when there is no marked hereditary predisposition.

Our prognosis will generally be unfavorable as regards permanent freedom from subsequent attacks, but favorable in so far as death rarely occurs as a direct result of the disease.

The remedies most frequently called for during and immediately after a paroxysm are Aconite, Belladonna, Ignatia, Gelsemium, Hyoscyamus, and Opium.

Other treatment, both medical and hygienic, may be called for in order to build up the general health and to lessen the neuropathic tendency.

SOMNAMBULISM.

BY SAMUEL WORCESTER, M.D.

Synonym.—Sleep-walking.

Symptoms and Ætiology.—Somnambulism or sleep-walking is not a disease in the strict sense of the word; allusion is made to it in a few text-books only, and even then it is mainly as a phenomenon occurring in connection with hysteria and epileptoid conditions.

Somnambulism means more than the mere fact of a person walking in his sleep; the acts may be extensive, varied, and elaborate. A man may rise from bed and, while sound asleep, may walk downstairs, harness a horse, take a drive, put up his horse on his return, go back to bed, and in the morning have no recollection of any such actions. A patient of mine rose from bed, built the kitchen fire, put on the coffee, set the table, went back to bed, and was all the time sound asleep. This sleep-walking differs from sleep-talking only in the part of the body through which the phenomena are manifested. Any kind of automatic act may be accomplished while in this state, and some even that would seem to require thought, judgment, and volition. Examples of this are to be seen in the history of the late war, where soldiers exhausted by fatigue would continue on the march both afoot and on horseback while sound asleep, and avoid the obstacles in the road.

It is not unusual for children, after playing hard all day, or after a supper of indigestible food, to get out of bed and walk or talk in their sleep, especially if they are of nervous disposition and temperament. For instance, one night a child of my own rose from bed, passed through another room into the hall, poured out and drank a glass of water and returned to bed, being sound asleep all the time; when asked what he wished, and where he was going, he made no reply.

In the somnambulistic state the sense of touch plays a very important part, and is in a highly sensitive state. It is this sense which enables a man to walk with safety along the steep roof of a house, close by the brink of a precipice, and in many dangerous places where the same person awake would at once grow dizzy and fall. He is entirely given up to the pictures of his imagination or, rather, of his memory, so that his actions are guided by this sense alone. This it is which enables him to accomplish other remarkable feats, such as to sit down and compose a letter or a poem, and write with accuracy and even elegance; also to play upon musical instruments, and do many things which require nicety of touch and skill in manipulation; such things seem to prove the truth of the saying that touch is the sum of all the senses put together, and it is this inherent instinct that makes us strive to handle an object before our curiosity in regard to it is satisfied.

Akin to the somnambulistic state are those instances where a person will wake from sleep and minister to the wants of a child or invalid, and even carry on a brief conversation, and in the morning will retain no recollection whatever of such action.

As a rule, the somnambulist has recollection of what transpires in his sleeping state, but in some cases it seems like a dream more or less distinct.

The two following cases illustrate two phases of somnambulism: Bernard S., a German, was lying quietly in bed with his wife; at midnight he waked with a start, doubtless under the influence of some terrifying dream. He perceived standing in front of him a hideous phantom; fear and the darkness of the night prevented his seeing clearly, so in a trembling voice he called out twice: "who goes there?" receiving no answer, and thinking that the figure was advancing toward him, he is seized with terror, seizes a hatchet which was always at his bedside, and hurls it at the supposed spectre. All this was done so rapidly that not a moment was given for reflection. A deep groan and a fall recalled the man to his waking self, and he found that he had killed his wife. As he was subject to fits of somnambulism, no punishment followed.

Dr. T. S. Clouston mentions the case of a man whom he saw in the

Edinburgh prison, whose heredity was highly neurotic, who had been an aggravated sleep-walker all his life, who, during his somnambulism, had vivid conceptions, hallucinations, and illusions, and who in that condition did all sorts of purposive acts in accordance with those false beliefs. He remembered his somnambulistic impressions in a vague way after he awoke. He was most difficult to awake. He once went up to his neck in the sea in Norway and did not awake. At last, one night, he got up, and while in a state of somnambulism, imagining he saw a white animal in the room, he seized it and dashed it against the wall. This turned out to be his child, whom he thus killed on the spot. He was passionately fond of the child, and had played with it the last thing before it had gone to sleep.

As was stated, an attack of somnambulism may be induced by an over-loaded stomach, excessive study, strong emotions, and fatigue. In some instances it seems to be hereditary. Not unfrequently the condition of nervous excitability attains such a height that it goes beyond physiological limits, and its subjects are affected with hypochondriasis, ecstasy, hysteria, or catalepsy.

Dr. Maudsley says: "There is no doubt that some persons may rise from their beds while asleep, go through a series of complicated actions, and retire to bed again without awaking, in the morning feeling weary, tired, and out of sorts, but remembering nothing of what they have done, or remembering it only as a dream. If a crime were done by a person in this condition there could be no question of responsibility. But it must be borne in mind that it might easily be pretended, and assuredly the assertion of its occurrence *for* the first time when a crime had been done would be extremely suspicious. It is really, if not itself a kind of nervous disorder, very closely allied to such nervous disorders as epilepsy, catalepsy, and hysteria; it certainly indicates a decided neurosis; wherefore if any one really was subject to it, there could hardly fail to be evidence of previous occurrence or of distinct nervous troubles."

Pathology.—It seems hardly proper to speak of pathology where the existence of disease is not fully recognized, but the important and interesting question arises: what is the condition of the brain during an attack? Dr. T. K. Chambers, author of the article upon this subject in Reynolds's *System of Medicine*, says that "the slumber is so morbidly profound that resisting spontaneity is lost, and the obscure images, known as ordinary dreams, are able to exert a motor power. Again, decided somnambulists are entirely ignorant of what they have been doing during sleep; whereas dreams which occur during a partial waking are always remembered more or less."

The examples given in this article, together with others even more forcible that might be cited, do not seem entirely in accord with the above statement. Decided somnambulists may remember, as in a dream, even the minute particulars of acts done in sleep, as in the case of the abbot who one night entered the cell of a monk who fortunately happened to be awake; he bore in his hand a sharp knife, and had a fierce expression upon his countenance. The monk hastily and noiselessly slipped out of bed. The abbot approached and plunged the knife several times through the clothing where the monk had been lying. The next morning the abbot had a troubled look and asked the monk whether anything unusual had occurred the previous night, as he dreamt that he had attempted to kill him, and the impression was so vivid that he could not shake it off.

Doubtless, in some instances, the acts performed are the direct outgrowth of thoughts which engrossed the mind when awake, and are under their control, as when a person works on a slate a difficult arithmetical problem which, unsolved, had occupied his mind on going to sleep.

We know that in the form of disease called epileptic vertigo, the discharging lesion mainly spends its force on the higher ideational centres or tracts; as a result, while there is no apparent loss of consciousness, the actions are often as automatic as those in somnambulism. Thus, in the case of George Winnemon, who was tried for murder, it was shown that after an attack of epileptic vertigo he spent most of one day rowing upon the lake, and yet he had no recollection of leaving the house. In another instance, a young man shipped as a sailor, and on regaining his full consciousness was surprised to find himself several days' sail from land.

It seems to me that the cerebral condition is very similar in both cases. The higher ideational tracts, where real consciousness and judgment is located, are asleep, or their connection with the lower tracts is suspended. These lower tracts, where all recent impressions are received, the real working-room of the brain, are partially awake and in a state of activity, but freed from the restraint, guidance, and oversight usually exercised by the higher ideational tracts. This portion of the brain, the sensorium commune, kept in action by stimulus from without or within, in connection with the cerebellum and basal ganglia, originates and executes various movements, having every appearance of being prompted by the judgment and higher consciousness, but in reality they are as automatic as any of our acquired tricks of speech or act. In some instances this abnormal impulse may be forcible enough to make an impression upon the higher cortical cells, in which case the person awakes, or remembers the occurrences as a dream; when the impulse is weaker, or expends its whole force downwards, there is no consciousness whatever.

ALCOHOLISM.

BY SAMUEL WORCESTER, M.D.

Synonyms.—Alcoholismus, Ebrietas, Mania à potu, Delirium tremens, Chronic alcoholic intoxication, Trunksucht.

Definition.—Alcoholism is a disease of the general nervous system, caused by the continued use of alcoholic liquors. It may be acute or chronic, and may affect every organ and function of the body.

It does not come within the scope of this article to treat of the condition commonly known as "being drunk," but we shall consider: 1st, the acute paroxysm called delirium tremens, which is caused by an unusual excess or prolonged debauch, or by the sudden deprivation of the accustomed stimulant; and 2d, of the state to which the term chronic alcoholism is applied, being the mental and physical condition of those who habitually use what is for them an excess of alcohol.

Delirium Tremens.—The cause of an attack of delirium tremens is the continued poisonous effect produced on the nervous centres by blood strongly impregnated with alcohol. This depresses and paralyzes the nerve-centres, especially in the brain, and incoördination of ideation and motion results.

The immediate occasion of an attack may be either the drinking of an unusual quantity of liquor in a short time, a prolonged spree during which but little food or rest is taken, or the sudden stoppage of the supply of liquor. Some are disposed to deny the existence of this last cause, but too many instances have come under my own observation not to have me recognize the fact that in those who have been drinking heavily severe attacks of delirium tremens may be produced by the sudden withdrawal of the accustomed stimulant.

The first symptoms are loss of appetite, restlessness, inability to sleep, and irritability. The tongue is furred white, complaint is made of a badly tasting mouth, and the breath has a peculiar, foul odor; the smell and taste of food produce a sense of disgust and nausea, and in some cases the taste of liquor has the same effect. I have heard hard drinkers remark that they are safe from delirium tremens so long as they can eat. There is but little sleep, and that is broken and disturbed by frightful and distressing dreams. The face is pale and haggard, the eyes suffused, and the pupils dilated; the pulse is full, rapid, and tremulous, and the skin is bathed in perspiration. Complaint is often made of distress in the stomach and bowels, and of constriction across the chest. Disturbances of sensibility are common, such as the "pins-and-needles" sensation, and a feeling as if a fishbone or hair were lodged in the throat.

Tremor is one of the earliest and most constant symptoms. The tongue is protruded slowly and trembles all the time until drawn in again. There is also marked tremulousness of all the limbs, both on motion and during rest.

These symptoms rapidly increase in intensity, especially the sleeplessness and restlessness, and hallucinations of hearing and sight come into prominence, the latter being most common. The patient talks incessantly in an incoherent manner, and sees all kinds of horrible and disgusting animals around him. Reptiles, snakes, frogs, and mice seem to crawl all about the room and over the bed. Imaginary persons are abusing him, and he hears strange whisperings that indicate personal danger. He is terrified and suspicious, and so far as possible his actions are in accord with the character of his hallucinations and delusions which are constantly changing. Often there will be sudden outbursts of violence, followed as suddenly by quiet and a flood of tears. At such times there is danger that he may do bodily harm to himself or others, though usually he can be guided by his attendant, and feels grateful for his protection.

An attack seldom lasts more than a week, when the patient gradually becomes more quiet and begins to sleep and eat. Some cases, however, end fatally from coma and exhaustion.

Treatment.—The principal object in view is to keep up the patient's strength, and for this purpose we should administer as freely as possible concentrated food, such as beef-tea, Valentine's beef-juice, Murdock's liquid food, etc. At a later period, when the patient is more willing to take nourishment, milk, eggs, and broths of lamb, beef, or chicken should be given. Exhaustion from want of food is one of the contributing causes of the attack, and both sleep and strength will be promoted by a nourishing diet.

Some of our homœopathic authors suggest, or rather allow, the use of Chloral hydrate in those extreme cases where it seems absolutely necessary to force sleep in order to prevent exhaustion. For this purpose a full dose (grs. xx–xl) may be rubbed up with equal parts of simple syrup and Balsam of Peru, and given at bedtime. For some persons the Chloral hydrate seems injurious, and the use of Morphia or Bromide of potassium is absolutely contra-indicated in this disease.

Cinchona, Belladonna, Gelsemium, Agaricus, Cannabis indica, and Nux vomica are the remedies I find of most frequent service. When hallucinations are a marked feature, Hyoscyamus and Stramonium will also require study. In some cases which come under treatment in the early stage, when the patient begins to feel nervous and shaky, Capsicum or Cinchona, given in the stronger dilutions, will often prevent a full attack.

CHRONIC ALCOHOLISM.—The habitual use of intoxicating liquors has the effect of compelling one to continue their use and to increase the amount taken. Thus the nervous system is kept under the influence of the poison, and a condition results known as chronic alcoholism—manifested by disorders of motion and sensibility, by changes in the habits of life, and abasement of the moral and intellectual faculties.

One of the first symptoms noticed is a shakiness, or trembling, of a rhythmical nature, on rising in the morning; this is attributed to nervousness, and passes away in a few moments after taking a glass of liquor. This tremor affects the muscles of the face and lips, and is very prominent in the extremities; walking is accomplished in an uncertain, hesitating manner, and the hands tremble so that it is not easy to button one's clothes or to use a razor with safety. At first the tremor will be noticed only when the system has been deprived for several hours of its accustomed stimulant, as in the morning on waking; but later it tends to become constant, and is only held in check while the system is under the primary stimulating effect of the alcohol.

When the disease is fully developed there is not merely the trembling, but also a constant mental restlessness, compelling a frequent change of position. These symptoms, together with the real muscular weakness accompanying, may become so severe as to resemble the phenomena of paralysis agitans or locomotor ataxia, according as the arms or legs are the more affected; and in some cases there may be true paralysis, usually of the lower extremities. As Dr. Wilks says: That the brain should be affected in one case, and the spinal cord in another, is due probably to the same idiosyncrasy which makes one man get drunk in the head and another in the legs.

From the beginning there is a varying amount of anæsthesia; this usually commences, and is most marked, in the extremities. It may increase to such an extent that the sense of pain is lost; pins may be thrust into the flesh, or the foot burned without any discomfort to the patient. There is also an inability to hold objects firmly when the eyes are closed, or to determine their nature by the sense of touch alone.

In rare cases the motor disturbance may be so great as to cause epileptiform convulsions, especially in the later stages of the disease.

The habits of the patient are changed; he becomes irritable and unreliable, careless in his dress and of his personal appearance, uninclined to make any exertion, and is without ambition. His face indexes the nature of the malady, the muscles lose their play, and his countenance wears a woe-begone and sorrowful expression, or else an inane, vacant look. The eyes are dull and heavy, except under the temporary influence of stimulants; the pulse is soft, full, rapid, and compressible.

While the effect of a moderate dose of alcohol upon a person not accustomed to its use is to exhilarate and quicken the intellectual powers and the imagination, the condition is far otherwise in chronic alcoholism. Here the bodily activity and mental faculties are alike deadened. The intellect is dulled, perception obscured, the memory weakened, ideation rendered incoherent, and the power of reasoning destroyed. The various actions of the body also show the lack of co-ordination, and articulation is slow and imperfect. The man seems stupefied and brutalized, and leads a mere vegetative existence.

In another class of cases the demoralizing action of the poison is mainly exerted in the direction of the moral faculties, and this class possesses a greater importance from a public standpoint than does the former; the one affects the individual and his family, the other, leaving comparatively intact the intellectual and physical powers, perverts and degrades the whole moral character. The individual loses all his good qualities, and they are replaced by the most violent and irresistible passions urging him to deeds of wickedness and crime. If this is true, and the effect of chronic alcoholism is to induce such a state in those naturally endowed with good instincts and desires, how much more vicious, ungovernable, and degraded should we expect those victims to become who have had no moral or intellectual training which might serve as a partial restraint? Those persons never having had their good instincts developed, should we wonder then that so large an amount of the crime and misery of the world is the direct result of the use of alcohol?

Dr. Morel published an account of his visit to some young Communist prisoners who were taken with arms in their hands, defending the barricades. About 150 youths, from 10 to 17 years of age, were confined in the prison at Rouen. He says: "They were indeed children worthy of their parents, precocious murderers and incendiaries, upon whose countenance was set the triple seal of intellectual, moral, and physical degradation. Deformities and all kinds of repulsive countenances were seen, and a failure of physical development."

The subjects of chronic alcoholism are prone to melancholy and suicide.

Pathology and Morbid Anatomy.—Alcohol seems to have a strong affinity for the brain and nervous system, and the most constant appearance is a congestion of the meninges and brain-substance. This, if long continued and often repeated, will produce thickening of the membranes, engorgement of the vessels, and degenerative changes. Dr. John C. Peters says in regard to the brain, that there was invariably present more or less congestion of the scalp and of the membranes of the brain, with considerable serous effusion under the arachnoid, while the substance of the brain was unusually white and firm, as if it had lain in alcohol for an hour or two, and the ventricles were quite empty. In not more than eight or ten instances did he find more red spots upon the cut surface of the brain than usual. The peculiar firmness of the brain was noticed several times, even when decomposition of the rest of the body had made considerable advance.

Treatment.—The treatment of a case of chronic alcoholism is attended with many difficulties, mainly from the fact that the patient has not sufficient will-power to coöperate with the physician. It is absolutely necessary that the use of liquor should be wholly stopped. I have never seen any case where the so-called tapering-off was necessary or even desirable. The patient should be placed amid as pleasant surroundings as possible and watched *constantly*, as he will resort to any subterfuge to obtain the coveted liquor, and the sense of honor, truthfulness and integrity are lost so far as this point is concerned. Cologne, bay-rum, toilette water, camphor, anything and everything containing alcohol will be found and swallowed without scruple. During the first week of treatment ginger-tea, pepper-tea, Murdock's food, broths of various kinds, eggs, and cream should be urged upon him, and food should be given at short intervals in order to overcome the craving he feels for his accustomed stimulus. The tincture or an infusion of Lupulin may be given at night to aid in sleeping. When there is great restlessness and absolute inability to sleep, Gelsemium is the main remedy. At a later period remedies will have to be chosen with a view towards building-up the broken constitution.

SUNSTROKE.

BY SAMUEL WORCESTER, M.D.

Synonyms.—Heat-stroke, Coup de soleil, Insolatio, Thermic fever.

Definition.—A disease of the nervous system, principally of the brain, caused by direct exposure to the sun's rays, or by overheating the body.

Ætiology and Description.—Sunstroke is a disorder whose existence was noticed ages ago. Thus we read in the Scriptures that as Manasses, the husband of Judith, " stood overseeing them that bound sheaves in the field, the heat came upon his head, and he fell upon his bed, and he died in the city of Bethulia ; " and elsewhere it is written of the Shunamite's son that, " when the child was grown it fell on a day that he went out with his father to the reapers, and he said unto his father, My head, my head. And he said to a lad, carry him to his mother. And when he had taken him, and brought him to his mother, he sat on her knees till noon, and then died."

Sunstroke may be produced both by exposure to the direct rays of the sun, and by prolonged overheating of the body, especially when the system is lowered by fatigue, over-exertion, or excesses of any kind. Troops are frequently attacked by it when on forced marches, or when obliged to sleep in crowded and ill-ventilated barracks, while the regulation dress of the soldier, impeding the free expansion of the lungs, together with his heavy equipments, predisposes to the occurrence of sunstroke, and this may vary in severity from slight dizziness with inability to walk straight to violent epileptiform convulsions and almost immediate death.

There are three forms of this malady, one showing the symptoms of syncope, another those of apoplexy, and the third those of heat-fever. The *syncopal* form is the most fatal and sudden in its results, but on the other hand recoveries from it are more perfect than from the other forms. In this variety the patient falls suddenly as in a kind of syncope, generally without warning; in other cases, however, certain symptoms precede the stroke, and show that the blood is becoming overheated, such as a dry and hot skin, red and staring eyes, dizziness and fulness of the head, and faintness. This result is probably due to the effects of the heat acting directly on the spinal centre, and thus giving a shock to the heart. In fatal cases death results so suddenly that treatment could avail nothing. When a reaction occurs, the symptoms of fever are developed, with a quick pulse and a rise of temperature to 108° or 110°.

The apoplectic variety is the one to which the term sunstroke is most commonly applied. Its subjects are generally those who, after some imprudence in eating or drinking, are exposed to the direct rays of the sun, either on the street or while working in the field. They complain of the heat, of an undue fulness and throbbing in the head, and suddenly fall to the ground more or less unconscious. The head is hot, the face flushed, and the limbs perhaps convulsed; the breathing is stertorous, and there may be vomiting and involuntary micturition. If death results, it is from deepening coma, with cold clammy skin, feeble pulse, and irregular breathing. When the patient rallies, recovery is slow and imperfect, and he is subject in after-life to cerebral disturbances of various sorts, such as headache, impaired memory, want of energy, irritability, and even epilepsy. From one-third to one-half the cases result fatally.

Heat-fever, or the *hyperpyrexial* form, is an intense fever resulting from the gradual or sudden overheating of the body, which produces vaso-motor paralysis affecting the sweat-glands. While the influence of this external heat continues, there is no longer any cooling of the surface to counterbalance it by perspiration and the evaporation of the sweat; the temperature of the blood must therefore rise, and this rise causes a rapid destruction of the red blood-corpuscles, with accumulation of effete matters in the blood. The temperature may rise to 110° or 112°. "This gives rise to intense fever, extreme thirst, and frequent micturition; there is a burning skin which may be either dry or moist; dyspnœa, with quick, gasping, and irregular respiration, and great restlessness; a strong determination of blood to the head, attended by visible pulsations of the carotids, and dark livid appearance of the face and neck. The pupils, which are at first contracted, sometimes become widely dilated. The pulse also varies, being in some cases rapid and jerking, in others full, slow, and labored." (C. P. Hart.)

Pathology and Pathological Anatomy.—With an occasional slightly congested appearance of the brain and lungs, neither those organs or the heart show any marked post-mortem changes, and there is very rarely any cerebral hæmorrhage; hence it is plain that death is not due to apoplexy. That it is due to asphyxia is evident from the engorgement of the venous system and viscera with dark grumous blood.

As was intimated above, the pathology of heat-stroke seems to be, first, paralysis of the centre for the regulation of body heat, located in the cervical cord; and second, paralysis of the cardiac and vasomotor centres in the medulla oblongata. The regulating power in the body which preserves the normal standard of warmth by means of the perspiration being thus destroyed, the blood becomes overheated. This overheated blood becomes a poison which acts through the medulla oblongata, and produces the attack of syncope or asphyxia.

Treatment.—The treatment adopted in the army was to carry the patient into the shade, loosen the clothing about the upper part of the body, and pour cold water upon the head; in some cases drachm-doses of the aromatic spirits of ammonia were given with good effect. The foregoing is what, in the main, we attempt to do in private practice; water, as cold as can be procured, should be freely used both by affusion and bathing, and should be applied to the head, neck and spine. During the first stage, while the patient is unconscious, especially in the syncopal form, the inhalation of a small amount of Amyl nitrite will be of service, and a little later the internal administration of Camphor will help the patient to rally from the shock.

Belladonna, Gelsemium, and Glonoine are the three remedies most frequently of use, and may be given according to their well-known indications.

VERTIGO.

BY SAMUEL WORCESTER, M.D.

Definition.—Vertigo or dizziness is the sensation of swimming in the head which we experience when external objects seem rapidly moving around us, accompanied also by a feeling as if staggering, and a dread of falling.

Description and Ætiology.—Vertigo may be felt either as though the contents of the skull were in motion, surrounding objects remaining stationary, or as though the brain were steady, and external objects in motion. In either case it seems as if the body were unable to adjust itself to its surroundings.

Though vertigo may not, strictly speaking, be a disease in itself, it is a prominent symptom in diseases of the coördinating apparatus by which equilibrium is maintained, as in lesions of the cerebellum and in Ménière's disease. It is also prominent in dyspepsia and disorders of the stomach, in anæmia and congestion of the brain, and in some diseases of the motor cranial nerves.

The maintenance of an erect position involves the coördinate action of three factors, viz.: a system of afferent fibres conveying tactile sensation, a coördinating centre, and efferent nerves connected with the muscular apparatus. If any one of these factors is disturbed, equilibration is affected to a certain degree. The afferent system is itself of a complex nature, but mainly composed of three divisions, lesions of either of which will seriously disturb equilibration and produce the sensation of vertigo. These three divisions are: 1st, organs of transmission and reception of tactile impressions; 2d, organs for the reception and transmission of visual impressions; and 3d, the semicircular canals of the internal ear with their afferent nerves.

In most cases of vertigo, from whatever cause arising, we find functional disturbances of the special senses, such as indistinctness or mistiness of vision, black specks or flashes of light before the eyes, and hemiopia, also deafness or over-acuteness of hearing, tinnitus aurium, and all kinds of strange noises. There may also be perversions of the sense of smell.

While several forms of vertigo are mentioned by authors, only two varieties are important enough to require our attention here, viz.: gastric or stomachal, and aural or labyrinthine.

GASTRIC OR STOMACH VERTIGO is generally attended with headache of a throbbing or splitting nature, and is a frequent symptom of gastric disturbance. The vertigo is caused by reflex irritation of the cerebral vessels from visceral irritation either of the stomach, liver, or alimentary canal.

In many instances cerebral anæmia or exhaustion from overwork, either mental or physical, is a predisposing cause, while the attack is immediately due to an overloaded stomach. At times the cerebral symptoms of dizziness, blindness, ringing in the ears, and throbbing of the bloodvessels may be so great as to mask the symptoms of gastric disturbance.

Chronic gastric vertigo is very common among brain-workers and those who follow sedentary employment, and is frequently considered by them as indicative of impending cerebral disease, such as hyperæmia or apoplexy. This error is easily made, since the symptoms of gastric involvement are not strongly marked, and indicate retarded rather than perverted digestion. Nausea and vomiting are not as frequently met with as in the acute form.

Bryonia.—Gastric vertigo, with nausea and disposition to faint; flatulence and constipation; burning in the stomach and nausea; bitter taste in the mouth; worse on rising from a recumbent position and on motion.

Cinchona.—Gastric vertigo, especially when associated with bodily weakness or anæmia.

Ipecacuanha and **Tartar emet.**—When the nausea is a prominent symptom; also empty retching and great prostration.

Nux vomica and **Pulsatilla** are two other remedies frequently indicated. The symptoms calling for their use are too well known to require detailing here.

AUDITORY VERTIGO, LABYRINTHINE VERTIGO, MÉNIÈRE'S DISEASE.—To Ménière belongs the credit of first calling attention to the fact that vertigo and other symptoms, usually referable to congestion of the brain or gastric disturbance, might be dependent upon disease of the labyrinth, and more especially of the semicircular canals. The disease is marked by attacks of vertigo, associated with noises in one or both ears, and partial deafness and nausea.

The attack occurs suddenly and without warning, though it may be subsequent to some catarrhal inflammation of the middle ear or exposure to the wind or cold. The patient is suddenly conscious of a snap or explosive report in one ear, followed at once by vertigo and a feeling of nausea, with faintness. Everything seems in motion, himself included, and there is a tendency for him to reel from the affected side. In a case observed by Charcot, in which the lesion mainly affected the left ear, the direction of reeling was principally forwards, sometimes it was backwards, and occasionally there was a sense of rotation in a vertical axis *always from left to right.* In a case reported by Ferrier there was also a lesion of the left ear, characterized by paroxysmal buzzing and reeling. In this case the reel is usually to the right side, but frequently the patient feels as if he were suddenly lifted off the ground and pitched forward and to the right side. On one occasion he spun round several times from left to right, and fell heavily on the right side of his head, causing a deep scalp wound. Another patient compares the sensation to being rapidly twirled in a swing.

As the vertigo and buzzing appear together, so too after a short time they pass away together, leaving partial or complete deafness. At first the whole attack is paroxysmal in its character, with the exception of the deafness which remains, but after many attacks the condition may become chronic. I know of one case where for months there may be deafness and vertigo, when suddenly, with a loud report, the hearing will be perfectly restored and the dizziness gone; this condition may continue for two or three weeks, and then the attacks will recommence, and deafness set in as before. This patient at various times likens the noise heard to the ticking of a clock, the buzzing of a sawmill, and the snapping of a cap; the latter sound is more apt to accompany a severe attack. The left ear is principally affected, but the noises and deafness are in both. Nausea has always attended the attacks during which she loses her hearing, as well as at other times, but has not been noticed either time, some five or six, when her hearing has been suddenly restored.

The four diagnostic symptoms of this disease are sudden vertigo, buzzing in the ears, nausea, and deafness.

Pathology.—Experiments upon animals show that disturbances of equilibrium may result from both irritative and destructive lesions of the semicircular canals of the labyrinth. Hughlings-Jackson has shown that it is not necessary that there should be direct lesion of the semicircular canals in order to produce vertigo, for various irritative and indirect affections which cause pressure will produce the same effect. Ferrier says: "From the researches of Flourens it would seem that *negation* of the horizontal canal on one side causes the body to be thrown or spun *towards the same side*, and that negation of the superior canals causes the body to be thrown forwards, and a like negation of the posterior canals causes the body to be thrown backwards. We should, therefore, expect that if the lesion is an irritative one the phenomena *would be reversed*, and that, therefore, irritation of the left horizontal canal should cause a feeling of rotation to the right side, and *vice versa* in case of irritation of the right; and similarly a feeling of being hurled forwards or backwards, according as the irritation affected the posterior or superior canals respectively," and we find such to be the case.

The vertigo or dizziness does not seem entirely due to the disturbance of the equilibrium, for this alone does not produce reeling and giddiness; it seems due rather to the incongruity existing between the visual and labyrinthine impressions, both of which are used in maintaining an erect position and in judging of the relative position of objects.

Hughlings Jackson ascribes the nausea so generally present to the intimate connection existing between the auditory and vagus nuclei in the medulla oblongata, but it seems more reasonable to agree with Ferrier in thinking that there is a higher coördination of visceral with auditory and other impressions than that of the medullary nuclei. He says: "There is much in favor of the supposition that visceral impressions form one of the factors in the consensus which regulates equilibration and coördination, and that, therefore, their afferent nerves are coördinate with the tactile, optic, and labyrinthine nerves in the encephalic centres of equilibration and coördination."

Treatment.—*Amyl nit.* is the remedy which seems most efficacious in relieving the unpleasant symptoms during an acute attack. It has a bursting sensation in the ears, as if the drum of each ear would be forced out with each beat of the heart; great throbbing in the head and ears, with confusion, vertigo, nausea and faintness.

Dr. C. P. Hart names ten remedies as indicated in Ménière's disease, but I have generally had to select my remedy on other indications than the vertigo alone. In one case Lycopus virg. produced marked improvement when given for coexisting heart trouble.

CHOREA.

BY SAMUEL WORCESTER, M.D.

Synonyms.—St. Vitus's dance, St. Guy's dance, St. John's dance; Tarantismus, Folie musculaire, Chorea magna, Chorea minor.

Definition.—We understand by chorea a complex neurosis, subacute or chronic in its course, chiefly attacking children during the period between the second dentition and puberty. Its seat may sometimes be the brain alone, sometimes the entire nervous system. It is characterized by incessant twitchings or jerkings of groups of muscles, which are sometimes spontaneous in their origin, and sometimes excited by voluntary impulse, which occur almost exclusively in the waking state, and are often accompanied by a more or less developed mental disturbance. It is a very unpleasant disease, but, as a rule, neither painful nor dangerous, and is not attended with fever. The patient is neither deprived of consciousness nor volition. The ordinary movements of the body performed under the guidance of the will, are disturbed and made uncertain; the voluntary action is arrested, and the limbs forced to take another direction from the one intended, rendering the movements uncertain and imperfect. All the voluntary muscles of the body are liable to these irregular clonic spasms.

Ætiology.—Chorea is emphatically a disease of childhood, and, though cases are on record where it has affected very young children and even the aged, yet, three-fourths of the cases occur between the periods of the first dentition and puberty. Niemeyer says that it is most frequently seen between the ages of six and fifteen. I have seen one case of chorea magna in a man aged nearly fifty. Girls are more liable to it than boys, in the proportion of nearly three to one, probably on account of their more delicate nervous organization and the preparative changes going on before menstruation.

It is more frequent during the moist, cold months of spring and early summer, and comparatively rare in the warm weather or hot climates. It seems also a disease of cities where many persons are crowded together, and many country physicians never see a case.

The exciting causes are frequently such as act upon the emotions, viz., fright, fear, terror, and anxiety, and it occurs particularly in children who have inherited the nervous temperament from the parents.

Hysteria in the mother is most effective in this respect, especially in giving rise to what Dr. Weir Mitchell terms "habit chorea." Chlorosis, anæmia, dysmenorrhœa, scarlet fever and diphtheria often precede the outbreak of chorea, while the relations existing between it and rheumatism seem well established. It is undoubtedly contagious, that is, taken by imitation by those children whose nervous system is very impressionable. Dr. Allan McLane Hamilton says: "The disease often follows scarlatina or other zymotic febricula, or takes its origin from an attack of acute rheumatism—most frequently this is the rheumatic fever, but even simple rheumatism of the muscles without febrile disturbance and articular disturbance may give rise to it."

It may also result from over-study, bad air, bad food, or worms. An investigation in regard to its occurrence among school children showed that over twenty per cent. of the young children in the public schools of New York are affected with choreic affections of greater or less gravity. These varied from slight movement of the hands and twitching of the facial muscles to such as attracted the notice of visitors. In some cases the disturbance of the nervous system which causes the outbreak is not of a mental but of a reflex nature, owing to some peripheral irritation spreading to the nervous centres.

While nearly all observers agree in considering heredity a strong predisposing cause of chorea, although the disease itself is not transmitted, Putzel asserts that chorea results only when the hereditary influence is weak in its character, and that when this is strong we meet with the more marked and positive neuroses, such as hysteria, neuralgias, epilepsy, and insanity.

Symptoms and Description.—An attack of chorea is generally heralded by some premonitory warning in the way of slight modifications in the moral, intellectual, or motor spheres. The latter, however, may be so slight as in most instances to escape notice.

The beginning of a simple case of chorea may be as follows: The child, a boy of about ten years, of a nervous temperament, who attends school, becomes irritable, is restless at night, starting up in his sleep, and loses his appetite. His usual timidity changes to a real dread of seeing or being with others, and he is unwilling to go out and play with his mates. He becomes pale and thin, and sits by himself. His temper undergoes a marked change; he becomes morose, irritable, fretful, lazy, forgetful, and complains of headaches, dizziness, and chilliness. There may also be palpitation of the heart, loss of appetite, and general restlessness. At school the child is inattentive, unable to apply himself to study, and forgetful. He seems unable to sit quietly in his place, but is constantly in motion; this, together with some movement of the hand or fingers, some twitching of the face, or the dragging and shuffling of the feet in walking, attracts the notice of parent or teacher. He may be punished, with the idea that such movements are the result of bad habits or viciousness, but instead of doing good it only increases the trouble. The jerkings and convulsive movements cease at night, when he rests uneasily and is disturbed by bad dreams. Such is generally the state of affairs when the physician is called. What next is the natural unchecked course of the disease? If neglected, it will not be long before the movements become general; in some cases the muscular dance is so severe that voluntary movements are utterly impossible, and the patient becomes helpless. He cannot sit, stand, or lie down with comfort, and in walking the feet may drag along as if paralyzed. If he attempts to stand, his knees give way and he drops to the ground; and the whole body is so plunged, jerked, and shaken about that he cannot even sit still on a chair, and in extreme cases may be thrown out of bed. He may have to be dressed like a baby, and his clothes are so much pulled and rubbed about the body, that abrasions of the skin and eczematous eruptions are often produced.

In most cases, however, voluntary motion is not entirely abolished, but only impeded by a failure of the coördinating power. Although the involuntary motions may be incessant, the patient nevertheless succeeds in executing voluntary movements. It is true that he performs them in an awkward, clumsy, imperfect, and roundabout way; the intended movement is commenced, but interrupted by twitchings before it can be carried out. The patient then begins to manœuvre, and succeeds after a time in accomplishing his purpose; but at other times the effect of exerting the will seems to be an increase of the spasm, which, from having been limited to the face and hand, may then involve the whole body. A simple effort on the part of the patient to subdue the spasm and to keep his face and limbs quiet, is often sufficient to increase the violence of the twitches.

All the muscles of the body are not involved with the same frequency nor to the same extent; the muscles of the limbs, especially the arms, seem most frequently affected, and next those of the face. The abnormal movements ordinarily begin in one of the arms, and extend thence to the face, the trunk, and the legs. They are usually more marked on one side than the other and, in most cases, especially at the beginning and ending of an attack, are apt to be confined to one side, generally the left.

The muscles of the face are affected by contortions; thus all kinds of physiognomical expressions are produced, according as the spasm affects the different muscles one after another, and the general impression produced on the observer is decidedly laughable. The patient first frowns, then laughs, squints, winks, stares, moves his nose from one side to another, grinds his teeth, puts out his tongue, and as quickly puts it back again, bites the tongue, lips, and inside of the cheek, and grins like a monkey. In the muscles of the lower jaw the spasm is sometimes so violent that teeth are broken by it.

The vocal cords and muscles of the larynx may be affected, and, as a result, there is a certain degree of aphonia, so that the speech is husky and subdued, though in some cases it is shrill and squeaky.

Speech is almost always modified. The incoördination of the lips and tongue give rise to difficulties in articulation which are quite distressing both to the speaker and the listener, the words being "snapped" and cut short. The speech may become quite unintelligible. The patient begins a sentence but cannot finish it, because the tongue is in his way; sometimes he is only able to pronounce one syllable at a time. When asked to show the tongue, it is suddenly protruded and a moment after as suddenly retracted. This sudden protrusion and withdrawal of the tongue, termed the "choreic thrust," is almost diagnostic of the disorder. He cannot sing, because respiration is jerky and explosive; the air is not properly husbanded, and, although great efforts may be made, there is no result except great fatigue, from excessive disorder in the coördination of the muscles. Von Ziemssen has seen choreic movements of the abductors and other muscles of the vocal cords, and insufficient tension of the latter, by means of the laryngeal mirror; and this explains why the voice should be changed in character, and become monotonous and lowered in pitch.

In the progress of the complaint, a greater number of muscles are implicated and the spasmodic action intensified. The patient writhes, twists the shoulders, and contorts the body; the shoulder is pushed up and drawn down, the arm is jerked about, and the hand and fingers thrown in all directions. He cannot put a cup of tea to his mouth without a great deal of management, and is apt to spill it all over himself or his neighbor; mastication becomes difficult or impossible, and the first act of deglutition becomes impeded; the mouth is distorted, and the expression vacant. He is unable to work, write, play on musical instruments, or to button his clothes. The gait is peculiar and unsteady, one foot is dragged rather than lifted, and the patient staggers or sways from side to side, while the unequal and irregular respiration shows that the diaphragm and abdominal muscles are also involved. This incoördination in walking may be so great that the patient has to be guarded from striking against the walls and furniture, while in extreme cases it may be necessary to confine him to a bed upon the floor, and even then the patient will incessantly pick at the clothing, bedding, hair and face. In one case of chorea magna which lately came under my observation, the patient, a man, kept up a continuous circular motion of the right arm in a line with the axis of the body, regardless of the bruises incurred from rubbing against the clothes and furniture. The other parts of the body were involved, but to a less degree.

Allan McLane Hamilton doubts whether the choreic movements are always increased by the efforts of the will to stop or control them, and has been led to suppose that chorea might be divided into two varieties, viz.: one in which the movements are increased with the exercise of the will, the other when they are most violent in a state of rest. He considers the movements of the hands characteristic. He says there is a prehensile movement of the fingers and a rubbing of the ball of the thumb and ends of the fingers. There is a swinging of the arm, and a shrugging of the shoulder, as if the patient had on large or uncomfortable underclothing.

There is generally muscular rest during sleep, but this is by no means constant. In many cases there is great difficulty in falling asleep, owing to continuance of the muscular spasm, and sleep, when obtained, is not profound, but broken. The patient moans and grunts, and throws himself about in a restless manner. On awakening in the morning, there is at first muscular rest, but the spasm soon recommences, more especially on rising and making an attempt to dress.

In spite of the duration and violence of the spasmodic movements but little complaint is made of muscular fatigue. In some cases the nerves of the affected parts are tender to pressure, and there may be painful and unpleasant sensations of various kinds arising spontaneously, while certain portions of the spine (dorsal and lumbar region) may be unduly sensitive.

The digestive organs are at fault in many ways, both at the beginning of an attack and during its course; this is shown by attacks simulating dyspnœa, by nausea, pain, flatulence, and constipation.

The heart's action is frequently affected, giving rise to palpitation, irregularity, intermittence, and exaggerated impulse against the thoracic wall.

MENTAL DISTURBANCES are rarely absent, and become more developed when the disease lasts a considerable time. In the lighter cases they are but slightly developed, but in those of a severer type the character seems to change a great deal; nearly all are extremely irritable; good-natured persons become passionate; the peaceable, quarrelsome; the intelligent appear childish and simple. The judgment is perverted and ideation slow; there is indifference and want of respect to parents, teachers, and friends; there is great want of attention, and the memory is impaired. In addition, we should note the stupid facial expression so often met with, and the difficulty in making the patient understand the simplest things, showing a real defect of the intellectual powers. Some patients are shy and timid, all are more or less silly. In some, mania and imbecility follow after a time. These symptoms are not only observed toward the end, when they might be ascribed to exhaustion or anæmia, but are often present at an early period of the complaint, especially when there are tendencies to, or complications with, hysteria. In connection with the stupid look and apish behavior, these signs of depressed intelligence and altered character, especially when occurring in older children at and after the period of puberty, are apt to terrify the patient's friends, and the physician is often obliged to reassure them that idiocy will not result.

Varieties.—The terms chorea magna and chorea minor seem to have little value as applied to different varieties of the disease, but may serve to indicate the extent of the muscular disturbance.

An interesting form of the disease is that known as hemi-chorea, which is limited to one side of the body. It is most frequently seated in the left side, which is also as a rule more severely affected in bilateral chorea than the right; the unilateral character is not confined to the extremities, but extends to the face and the apparatus for articulation and swallowing. Dr. Ross says, in his work on Nervous Diseases, that this variety occurs in about one-fifth of all the cases, and in his opinion affects one side as often as the other.

There exists among adults and elderly people a form of chorea which may last for years and resists all treatment. The abnormal movements are as well marked as in the more common forms, but seem in a degree to be under the control of the will; the only mental change is a weakening of the memory.

Diagnosis.—As a rule, it is perfectly easy to distinguish chorea from the few diseases which it somewhat resembles. From hysteria it differs by its tendency to attack children, by its peculiar jerks and twitchings, and its aggravation from all voluntary exertion, while hysteria is marked by clonic or tonic spasm with periods of intermission, and also by the protean symptoms which simulate every disease and seem to attack every organ in the body. From epilepsy it may be easily distinguished by the absence of the loss of consciousness, aura, and convulsion peculiar to that disease. It differs from tremor and paralysis agitans in that both these diseases are more liable to attack adults and the aged, and that the trembling is more rhythmical and restricted in extent. Certain neuralgic *tics* give rise to a twitching of the facial muscles, but this is limited to a small and well-defined area, and the history of the case should make the diagnosis easy.

Pathology and Pathological Anatomy.—The pathology of chorea is yet unsettled; most authors agree with Drs. Todd and Russell Reynolds in thinking that the *origin* of chorea is cerebral rather than spinal; but there is no agreement as to the location.

The embolic theory of the production of chorea has received the support of such men as Mackenzie and Hughlings-Jackson. Dr. Hamilton says that he is inclined to adopt the embolic theory, not only because the paresis of the limb may precede any muscular movements, but because lesions in or about the corpora striata, which produce hemiplegia, may also give rise to choreic movements. We must bear in mind, however, that in many cases of chorea some very able and expert pathologists have been unable to find any emboli; and also that in undoubted embolism of the cerebral arteries there is never any appearance of chorea.

Dr. W. H. Dickinson lately published the results of the post-mortem examination of seven cases of chorea. He found remarkably uniform appearances, viz.: hyperæmia or distension of all the vessels of the brain and cord, but more particularly of the small arteries, which was succeeded by effusion of blood, with consequent irritation and injury of the surrounding tissue. "Speaking generally," says Dr. Dickinson, "the chosen seats of the choreic changes are the parts of the brain which lie between the beginning of the middle cerebral arteries and the corpora striata—the *partes perforatæ*, and in the cord the central portion of each lateral mass of gray matter comprising the root of each posterior horn." In none of these instances was any trace of embolism, such as decolorized fibrine, detached clots, or signs of impaction, to be found.

In a case examined by Dr. Ross, in addition to the appearances above mentioned, "the accessory cells of the anterior gray horns of the spinal cord appeared shrivelled, their protoplasm granular, the nuclei obscure, and many of the processes indistinct or absent; the larger fundamental cells did not appear much altered."

In twenty-two *fatal* cases collected by Dr. Dickinson, the heart was affected in seventeen.

While there is a general agreement that the corpora striata are involved in the disease, yet Meynert, Ross, Dickinson, Althaus, and Hughlings-Jackson, all seem to agree with Dr. S. Wilks, who "very much doubts whether chorea is due to any special disease of the spinal cord or other part of the nervous system, but rather, like epilepsy, due to a disturbance of the whole of the centres."

Dr. Henry P. Stearns, superintendent of the Hartford Retreat, says that the primary condition is one of *instability of nerve function*. Such a change has occurred in the elemental tissue of the nerve as to injure its power of activity so far as it is under the control of the will. The nerve has been stimulated to over-activity, or its energy impaired by other causes arising within the system itself. Dr. Hughlings-Jackson expresses the same idea, when he says that the "centres are diseased when half-educated," and that the symptoms are due to "under-nutrition" of the tissues affected.

The relations existing between chorea and the blood-changes resulting from rheumatism, diphtheria, and the eruptive fevers have received much attention, are generally accepted, and seem well established, though some authors of repute deny the connection. It seems true that while each period of life has diseases to which it is peculiarly liable, and its own regions of nervous susceptibility, chorea, with its motor disturbance, is the form in which defective nerve nutrition is apt to show itself in children, no matter whether the immediate cause be inherent or induced instability of the nerve centres, and whether this be produced by fright, over-study, or blood-poisoning.

Dr. Althaus says: "In a large class of cases chorea is owing to that alteration in the composition of the blood which is associated with rheumatic fever, and which is known to affect the nervous centres as well as other organs.

"In another large class of cases chorea is produced by direct irritation of the nervous system, which is either purely mental in its nature (fright, etc.), or partakes of a reflex character.

"Endocarditis exists in the large majority of cases of chorea, and is either pre-choreic, when the rheumatic influence has to be accused, or post-choreic, when we assume it to be due to irregularity in the action of the cardiac muscle; but endocarditis cannot be considered a cause of chorea."

Prognosis.—The prognosis of chorea is generally favorable, as the disease is rarely fatal except from exhaustion, sleeplessness, or some complication, such as dropsical effusion, epilepsy, paralysis, or some organic disease of the heart, brain, or spinal cord. The ordinary duration of an attack varies from a few weeks to months, but many cases are apt to become chronic; the tendency to a recurrence of the disease is strong, especially in those cases that have apparently recovered without treatment. When the irregular movements are confined to the muscles of one limb or those of the head, especially when occurring in the adult, they are rarely cured. The susceptibility of the nervous system to impressions is less in the adult than in the child; hence the probability of existing organic lesion is greater when the disease occurs in advanced life, especially if the limited character of the disease implies a local seat. When occurring during gestation, it is liable to produce abortion or premature delivery.

Treatment.—At present the principal remedies in vogue in the old school are strychnia, arsenic, iron in its various forms, phosphorus, cod-liver oil, Calabar bean, and zinc; and in a less degree the bromides, valerian, and asa fœtida. It is needless for me to say that each in turn is declared useless and cast aside, simply because they have no law guiding their choice.

Each case must be individualized and treated by itself. So far as possible, all exciting causes, both external and internal, should be removed and carefully guarded against. If there are co-existing disorders, as from intestinal worms, they should be met by the appropriate homœopathic remedy.

As the disease is one of defective nutrition, the diet should be regulated with care; the aim should be to build up the system, and all improper and indigestible articles of food are to be carefully avoided. Plenty of fresh air and sleep at regular hours are absolutely essential, and should be insisted upon; the child should be at once taken from school, and all brain-work forbidden; in some cases exercise in the open air is beneficial, in others rest is required, and the same is true as regards sea-bathing. In severe cases, when the patient is becoming exhausted by constant movements and loss of sleep, nutritious diet, an occasional sponge-bath with tepid water, exclusion of all company, and freedom from excitement will help us in our cure.

Moral Treatment is of the highest importance. While the child is so nervous and impressionable, we should never permit him to be startled by any harsh or quickly spoken words or any sudden shock. He should be managed firmly, gently, and judiciously; and all teasing and bullying on the part of his playmates should be quietly prevented. We should constantly bear in mind the value of food, rest and sleep as restorative forces without whose aid medicine can do nothing.

Medical Treatment. — **Actaea racemosa,** or **Cimicifuga.** — This remedy is frequently indicated and has mainly been given in the lower dilutions. It yields very satisfactory results in cases of chorea in patients with a rheumatic diathesis, those suffering from uterine irritation, and in cases resulting from physical causes. The abnormal movements consist of twitching, jerking, and twisting motions, usually unilateral and confined to the left side, often attended by pains of a neuralgic or rheumatic nature; depression of spirits and insomnia.

Nux vomica.—This remedy is often required, and is indicated in those cases when the child complains of vague flying pains about the legs and chest; also a twitching of the jaws and upper extremities. Other symptoms are a sense of numbness in the affected muscles; unsteady gait; the feet drag; movements renewed by the least touch, but lessened by steady pressure; impaired appetite; constipation, despondency; all the symptoms worse in the early hours of the morning.

Ignatia is useful when the left side is mainly affected; when the convulsive twitchings are brought on by fright or grief; are worse after eating; sighing and sobbing, and disposition to be alone are also characteristic.

Calcarea carb. is indicated in chorea connected with dentition, or in leucophlegmatic patients; also when the disorder is brought on from fright or onanism; there are the usual twitching of the muscles, trembling, and great weariness.

Hyoscyamus and **Stramonium** are favorite and often-indicated remedies. In the *Hyoscyamus* case the movements of the head are from side to side; the arms thrown about, the gait tottering, and the patient is talkative and easily excited to laughter. The symptoms calling for *Stramonium* are exceedingly characteristic; the convulsive movements have the feature of affecting the parts of the body crosswise, as, for instance, the left arm and right leg, while the other limbs are unaffected; or the muscles of the head and neck are violently agitated; or the spasms may involve the whole body, compelling the performance of the most grotesque leaps, motions, and gestures; is full of fears; handles the genital organs; weeps and laughs alternately.

Sulphur may be useful in chronic cases after suppressed eruptions, or when eruptions characteristic of the remedy are present; the patient is peevish, irritable, and obstinate.

PARALYSIS AGITANS.

BY SAMUEL WORCESTER, M.D.

Synonyms.—Shaking palsy, Parkinson's disease, Chorea senile, Chorea festinans.

Definition.—As the name would imply, we understand by Paralysis agitans a disease marked by a muscular trembling and by an impairment of the power to direct voluntary motion, gradually progressing to paralysis; there is also a peculiar alteration in the attitudes assumed by the patient.

Ætiology.—The disease is one of adult life, and usually attacks men between the ages of forty and sixty. Duchenne met with a case in a youth of sixteen, and Meschede in a boy twelve years old, as the result of an injury. Its causes seem very obscure, but as defective muscular innervation is prominent in most cases, it seems probable that such influences as would produce the one would give rise to the other. Most of the cases falling under my own observation have been of those who trace the beginning of the disease to the privations of army life, and to the exposures to cold and dampness. In one such case a severe attack of malaria preceded the development of the tremor. Dr. W. A. Hammond says that of twenty-five cases recorded by him, ten were apparently due to mental causes, and in five no cause could be ascertained.

Symptoms.—The disease may be sudden in its outbreak, but usually it develops slowly, in which case, for a few months or years, there may be promonitory neuralgic or rheumatic pains in the limbs. The tremor precedes any paralysis, and is the first symptom noticed. This generally begins in the fingers of one hand, and is shown by a difficulty in holding a pen or a needle. After a time this trembling spreads, until it successively involves the hand, arm, the arm on the opposite side, the legs, and some portions of the trunk, and the neck; the head is almost always exempt, and when at a later period this too seems affected it is only because the general trembling of the body is communicated to it. This is one of the points in which paralysis agitans differs from senile palsy and from disseminated sclerosis.

The tremor varies considerably in degree, from hardly perceptible vibrations to violent chronic spasm. Sometimes it is so slight that it escapes the eye, but is perceptible to the sense of touch. It is less when the patient is lying down, and in most cases ceases during sleep, even with those whose limbs are violently agitated during the day. It is much increased by excitement and by any effort of the will to control it; but it can, in the earlier stages, be arrested for a moment, when it occurs in the upper extremities, by knocking the hand forcibly on the knee or a table, and in the leg, by stamping the foot on the ground. It also becomes less when the patient makes voluntary movement of any kind, or when the attention is closely engaged about other things. The tremor has the peculiarity of being rhythmical in character. In one patient now under my care the vibrations are as regular and even as the swaying of a pendulum.

Dr. W. A. Hammond differs from most authors when he says "there is no bending forward, no festination." My experience is that there is both. The "festination" consists in the slowness with which they speak and act. Address to them a question, and there will be quite an interval before the answer. So too in walking. Charcot alludes to this when he says that there is a slowness in the accomplishment of movements rather than a real weakening of the motor power, and experiments with the dynamometer prove the truth of this assertion. Dr. Ross says too that "the patient gets up slowly and with difficulty from his seat, and *hesitates* for a few moments before starting, then, in the language of Trousseau, he looks as if pursuing his own centre of gravity. This gait has been called *paralysis festinans*;" and again, "In many cases the motor weakness is more apparent than real, the phenomena depending upon the great slowness with which voluntary movements are executed, the immense effort which all voluntary actions, even speaking, entail, and the readiness with which fatigue is induced."

A patient now under my care illustrates all these points well. Yesterday, when desiring to take his leave, he asked me to help him rise from his chair. I did so by bracing my right foot against one of his and extending my hand, which, after a pause, he grasped, waited a moment, then raised himself, and again paused ere he could feel the necessary confidence and propelling force enabling him to walk. This he did with his head and body bent forward, the neck stiff, and the knees as if jointless, while the feet were barely lifted from the floor but carried as if feeling the way along.

Here again I must differ from Dr. Hammond, who says that "there is no bending of the body forward." In my present case this is a prominent symptom, both in standing and sitting. Dr. Ross says on this point: After a time the muscles of the extremities, trunk, and neck become the subjects of *rigidity*, at first temporary, but ultimately becoming permanent, the flexors being affected to a greater extent than the extensors. "The rigidity of the muscles produces characteristic alterations in the attitudes of the body. The rigidity of the anterior cervical muscles causes the head to be strongly *bent forward*, and the patient cannot raise it or turn it to either side without great difficulty. The body is also inclined forwards when the patient is standing."

A singular feature of paralysis agitans is the tendency to forced movements. Some patients have the impulse to run forwards, and find it impossible to check it, and, as they go in an awkward manner, they meet with many bruises, and even fall. Some manifest a desire to walk backwards, as in a case mentioned by Charcot, who could excite the impulse to move backwards in a female patient by slightly pulling her back by the dress when she was standing. Dr. Althaus mentions a man who could only walk by clasping with both hands the hands of his attendant, and then running briskly backwards while the attendant followed him running forwards. In another case reported by him, the patient, when placed upright in the centre of a room, would at once reel backwards until he found a support for his back, and he could then stand for a long time. He had a difficulty in getting started for walking, but when he had once commenced he could walk several miles without stopping. When he was obliged to stop, he would reel back directly. He had no difficulty in going downstairs, but found it impossible to go uphill. A remarkable feature in the case was that the patient only had the use of his arms and hands while walking.

With the exception of the rheumatoid and neuralgic pains noticed in the onset of the disease, disturbances of sensibility are not marked; there is the sensation of weariness and of increased bodily heat, though the thermometer does not indicate any. In the later stages, numbness and the sensation of pins and needles may be present. In one of my cases the attack was ushered in by profuse offensive sweat, which stained the linen yellow; the color was gradually lost, but the offensive perspiration continued at intervals for years.

Diagnosis.—The diseases with which it would be most apt to be confounded are chorea, senile palsy, metallic tremor, and multiple or disseminated sclerosis. The age and history of the patient ought to render the diagnosis from chorea very plain. Senile trembling occurs in older persons, and the movements are more restricted and less violent. From metallic tremor it is mainly to be distinguished by the history of the case. "The tremor of paralysis consists of fine rapid oscillations; it persists during repose, may be temporarily arrested by a voluntary effort, and never implicates the muscles of the head; while the tremor of multiple sclerosis is more extensive, ceases during rest, is excited or aggravated by voluntary movements, and invariably implicates the muscles of the head."

Prognosis and Pathology.—Nothing definite is known as to the pathology of the disease, and many post-mortem examinations have been made without finding any lesions whatever. The prognosis is favorable so far as any danger to life is concerned, but decidedly unfavorable for recovery.

Treatment.—Plumbum and Tarantula are the only two medicines from which I have seen good results. Dr. C. P. Hart reports a well-marked case treated with Tarantula, by Dr. Cramoisy, in which a cure was made. My own cases have not been cured, but several have been much benefited.

ATHETOSIS.

BY SAMUEL WORCESTER, M.D.

The term athetosis, from *athetos*, without fixed position, was first used in 1871 by Dr. William A. Hammond to describe an affection mainly characterized by an inability to retain the fingers and toes in any position in which they may be placed, and by their continual motion. Since that date the group of symptoms comprised under this term have been studied by many eminent pathologists and neurologists, who, however, do not agree in their conclusions. Most observers decline to accept athetosis as a disease, and consider it a variety of motor disturbance of a post-hemiplegic character. Gowers says that "neither clinical history nor supposed pathology of athetosis affords ground for separating it from other forms of disordered movement commonly seen after hemiplegia, but any one of which might occur in the primary affection." McLane Hamilton says that it is a secondary affection to other neuroses as well as hemiplegia, and the literature of neurology is replete with examples of so-called athetosis, which are generally connected with hemiplegia, chorea, or even hysteria; and Dr. Hartshorne, the American editor of Reynolds's *System of Medicine*, says that "notwithstanding its occasional independence of paralysis, its place in nosology, at present, appears to be rather that of a symptom than of a disease."

Most of the observations were made upon persons affected with epilepsy or some other cerebral disease, while in some of the cases the primary attack seemed to be clearly apoplectic in its nature. Hemiplegia and hemianæsthesia are frequent accompaniments, as well as precursors, of the athetosis.

This last, according to Hammond, consists in continuous, slow, and somewhat rhythmical movements of the fingers and toes, which are forced to assume various distorted positions. These movements, consisting in part of alternate flexion and extension of the fingers and toes, and in part of complicated motor phenomena, persist during sleep, can be for a short time controlled by the will, and may, or may not, be accompanied by contractions. The affected hand or foot is also frequently atrophied.

According to Ross, bilateral athetosis has been observed by Clay, Shaw, and Oulmont as occurring in idiotic children. In these cases sensory disturbances have not been observed; there is an absence of a history of an apoplectic attack or convulsions having occurred during infancy, and consequently the affection was probably caused by a congenital defect or disease of the cerebral hemispheres.

From the symptoms alone, Dr. Hammond conjectured that the seat of the disturbance was in the gray matter of the optic thalamus or corpus striatum, an opinion which seems supported by the following summary of a case by Dr. Ringer, in which a post-mortem examination was afterwards made. "Dazzling before the eyes; dimness of sight; giddiness, preceding loss of consciousness, and followed by loss of sensation and speech, and motion of the right side, point conclusively to the left hemispheres of the cerebrum as the seat of the disease. The giddiness indicates the mesencephale, the loss of speech the posterior part of the third frontal convolution, the loss of sensation the thalamus opticus, and the loss of motion the corpus striatum, as the parts probably affected. As speech returned before sensation, and sensation before voluntary motion, the main stress of the disease must have fallen on the corpus striatum, and in a less degree on the thalamus opticus. It is probable, I think, that the cause of the disease is an embolon set free from the diseased mitral valves, blocking the middle cerebral artery."

The post-mortem appearances were in accord with the above statements, and the case is quoted at length by Dr. Hammond, as supporting his claim that athetosis is a distinct disease. I am unable to see the justice of such claim.

WRITER'S CRAMP.

BY SAMUEL WORCESTER, M.D.

Synonyms.—Scrivener's palsy, Telegrapher's cramp, Dancer's cramp, Pianist's cramp, Graphospasmus.

Definition.—Under the general term "writer's cramp" are gathered a number of different affections having this in common that there is an inability to perform the more delicate movements necessary in writing, sewing, playing on musical instruments, etc. The essential nature of the disease is a spasmodic action of the muscles of the fingers and hand, owing to their long-continued use in an unnatural and constrained position.

Ætiology and Pathology.—Age seems to have no direct influence in producing this disorder, except that persons of middle life are more largely engaged in occupations where long-continued writing is required; hence merchants, clerks, secretaries, and journalists are most frequently attacked, and it has been thought that the use of steel pens, on account of their want of elasticity, especially favors the development of the disease. Milkmaids, pianists, and telegraphers, who also use the smaller muscles of the fingers in a cramped and wearisome fashion, are liable to the disease. As a predisposing cause we must name here, as in so many instances, the nervous temperament with its susceptibility to all weakening influences. Since so small a proportion of those engaged in these occupations and exposed to the same influences are affected, the cause must be inherent in the individual, and not due entirely to the employment.

The pathology and pathological anatomy are entirely unknown. Remak states that in some cases he has found an inflammatory irritation of some of the superficial nerves.

Symptoms.—At first all that is noticed is a sense of weariness while writing, a stiffness of the fingers and wrist, a feeling as though the pen were not held quite firmly, and a want of decision in directing its movements; this leads one to grasp the pen more tightly, and to exercise greater care. The feeling of weariness next extends up the forearm and shoulders, and while at first this is only felt after writing awhile, later it is noticed on beginning to write, or even on taking the pen in hand. At the same time, no such feeling is experienced from attempts to execute coarser movements involving the whole arm and hand.

There are three varieties of writer's cramp: The spasmodic or spastic, which is the most frequent, the tremulous, and the paralytic.

In the spasmodic form there are tonic or clonic spasms of one or more muscles. These cause irregular strokes in writing, and when somewhat violent the thumb and finger are suddenly extended, and the pen drops; in other cases the hand is jerked away from the paper, or the hand is held firmly in its place for a moment from a sudden spasmodic contraction.

In the tremulous form we have what might be called a chorea of writing. Duchenne mentions a case where, on beginning to write, the patient was seized with an irresistible shaking and twitching of the little finger; this tremor began in the flexors of the forearm, extended to the hand, and increased in severity as the man persisted in trying to write. The writing consists of waving, undulatory, and uneven strokes, and is almost illegible.

In both these forms resort will be had to various expedients in order to overcome the twitching and trembling which prevent the writer from directing his pen as he would wish, and he will hold his pen in new and awkward positions; he will write slowly and carefully, pay attention to the formation of each letter, and even try to steady the hand by grasping the wrist with the left hand.

The paralytic form differs from the others in having no spasm, but is marked by an intense weariness and weakness of the whole arm and shoulder as well as of the hand, and in some cases this involves the back also. This weariness may be so severe as to cause real pain while writing, but passes off entirely during rest. It principally affects the flexor and extensor muscles of the hand, and the ulnar border of the forearm. In some cases there is a stiffness, so that the fingers cannot be used.

Attempts are occasionally made to persevere in writing by using the left hand, but in such cases the disorder soon spreads to that hand, and in as severe a form as the other. Telegraph operators who are attacked are sometimes able to continue their work by using instruments requiring different manipulation than the one formerly used.

Diagnosis and Prognosis.—The history of the case and its location ought to make the diagnosis clear. Our prognosis must vary with the case; in the more severe forms, where there is great lack of coördination and the disease has been of long duration, we can offer but little hope that the patient can ever write as continuously as before, or be enabled to earn his living by his pen, though he may write sufficiently for all the demands of social life. The recent cases and lighter forms may be cured by proper treatment.

Treatment.—Only within a few years has medical treatment been able to offer much encouragement in this disease. In all cases it is necessary to insist upon entire rest from writing or whatever employment may have produced the attack. In cases where this is absolutely impossible, the use of the "ring penholder," the stylographic pen, or a large-sized cork-penholder may palliate the case or even stay its course.

Gelsemium, Strychnia, and Zincum are the remedies which I have found most valuable, and to this list Dr. C. P. Hart has added Arnica.

Our best remedy, however, is electricity. This has been used in its various forms, but the faradic current, recommended by Dr. Duchenne, of Boulogne, is only useful in the paralytic form; the spasmodic variety is rendered worse by it. I have obtained my best results by using the continuous galvanic current after Dr. Poore's plan of directing the current down the muscles of the forearm, and at the same time make the patient continuously contract them by opening and closing the hand. Erb advises the use of the galvanic current, but says that when good effects have followed, the same results were obtained from all modes of applying it to the arm and back. He thinks the best plan is to galvanize the vertebral column in the cervical region, with ascending stabile and labile currents, and to combine with this the peripheral galvanization of the nerves and muscles of the arm which are specially affected.

Aside from electricity, the most successful treatment is that practiced by Wolff and reported in Le Progrès Medical, 1882. It is also quoted by Dr. Ross, and recommended by him. The treatment is a combination of gymnastics and massage. The gymnastic exercises consist of both active and passive movements. In the active form of exercise the patient is instructed to execute, three or four times a day, a series of vigorous movements with the affected extremity, the hand being opened and closed in quick succession. The number of these movements, and consequently the duration of each exercise, is progressively increased until a duration of about half an hour is attained for each sitting. In the passive movements the operator produces forcible traction three or four times a day upon each of the affected muscles separately in the direction of its length. This seems to be the most delicate part of the treatment, inasmuch as if too little strength is employed the cure is delayed, and if too much, the disorder is aggravated. When the spasm is notably diminished, which usually occurs in a short time, the patient is encouraged to take slow and graduated lessons in writing. The operator practices daily massage of the affected extremity, particular stress being laid upon percussion over the affected muscles with the ulnar border of the hand. Two of Charcot's patients were cured by Wolff in fifteen days. When no amelioration of the symptoms is produced in four or five sittings, Wolff believes that the treatment may be abandoned as not likely to prove useful.

ECLAMPSIA INFANTUM.

BY SAMUEL WORCESTER, M.D.

Synonyms.—Convulsions, Spasms, Fits.

Definition.—A disease of the nervous system occurring in children, characterized by involuntary spasmodic movements of the muscles and by loss of consciousness.

Ætiology.—Owing to the delicate and highly susceptible nature of the nervous tissue, especially that of the brain, during infancy and early childhood, convulsions are frequently met with, and cause many deaths. This convulsibility is greatly increased by the inheritance of the so-called nervous temperament.

Prolonged, difficult and instrumental labor which compresses the brain, seems frequently to act as a predisposing cause, even though the convulsion may not occur for months afterwards.

General debility, especially from an acute sickness, predisposes to convulsions, but many children who are fleshy, ruddy, and apparently well, may be suddenly attacked.

Dentition has always been considered a chief cause; when this process is performed in a physiological manner, no trouble is noticed; but when the gum takes on a cartilaginous quality, it prevents the development and the growth of the teeth outwardly; the tooth presses, therefore, on the pulp of the permanent tooth, which again presses on the nerves, and such a pressure may suffice in certain cases to produce painful sensations and their reflex motions in the form of convulsions (Schuetz). But that this alone is not the cause is shown by the fact that even free incisions in the gums over the tooth will not always stop or prevent the convulsion; and, further, by the fact that convulsions are much more frequent during the period of first dentition than of the second. The truth seems to be that the brain of a young child is extremely vascular, delicate in structure, and of rapid growth, hence it is much more susceptible to abnormal influences than at a later period when the tissues have become firmer and more stabile.

A very frequent cause is the gastric and intestinal irritation due to errors in diet or changes in temperature. Over-feeding, the giving of improper or indigestible food, and feeding at improper times may cause serious disturbance of the stomach and bowels. So too may exposure to heat or cold which give rise to a catarrhal condition of these organs. All these things may give rise to reflex convulsions by reason of the irritation conveyed to the cerebro-spinal centres.

The eruptive fevers do not exert so great an influence as was formerly supposed; scarlet fever appears to act the most frequently as a cause, but generally on account of the nephritic complications accompanying it.

The excessive heat of summer is a very frequent and potent cause of convulsions, both directly and by inducing such a condition that other causes operate more readily. It is not necessary that the child should be exposed to the direct rays of the sun, but merely that the temperature should be very high for several continuous days and nights. After such a heated term we will meet instances where the child has suffered for several days from exhausting diarrhœa, and has been kept in a badly ventilated room, lest he take cold. Suddenly he is attacked at night with convulsions resulting in coma and death. Such cases are erroneously considered to be cholera infantum, but are more properly due to heat-stroke. Dr. Althaus says that here the over-heated blood produces a paralytic state of the sweat-glands; while therefore the influence of external heat continues, there is no longer any cooling of the surface to counterbalance it by perspiration and the evaporation of the sweat; the temperature of the blood must therefore rise, and this rise causes a rapid destruction of the red blood-corpuscles, with accumulation of effete matters in the blood.

Convulsions are also caused by physical injuries, such as falls or blows on the head, and by mental influences, such as fright, or in nursing children by such causes as affect the mother strongly.

Symptoms.—The convulsion, except when itself the forerunner of some acute disease, such as one of the eruptive fevers, is generally preceded by premonitory symptoms showing undue excitability of the nervous system. The child appears self-willed, fidgety, and fretful; sleep is broken and disturbed by jumping, starting, and crying out. The head is hot, and the eyes have a tendency to squint. There is gritting of the teeth and twitching of the muscles, especially of the face and hands. The child is generally attacked when asleep, utters a scream, and becomes unconscious. Dr. Althaus thus describes the fit: the face is distorted; the eyes are drawn back into the orbit and rolled upwards; there is pallor, which is generally of short duration, and succeeded by lividity, owing to the accumulation of carbonic acid in the blood, respiration being arrested by spasm of the glottis and rigidity of the respiratory muscles. The face is sometimes perfectly black, and the veins of the neck appear filled to bursting. The neck is stiff; the head drawn to the side and a little backwards by the spasmodic action of the cleido-mastoid and trapezius muscles. The upper extremities are pronated, and the fingers strongly flexed; the lower extremities extended and rotated inwards or outwards. The spine is stretched, the chest-walls are rigid and inmovable, the glottis closed, and the diaphragm and abdominal muscles in a state of tetanus. The limbs are generally cold, and the body hot. Fæces and urine are expelled involuntarily, and death may take place with almost lightning-like rapidity in the first attack. In most cases, however, after tonic rigidity of the whole frame has existed for a short time, a whistling inspiration is heard; the glottis opens again, the chest-walls move, a little air is admitted, the face loses its lividity; the spine bends, the head is seen to fall back with each period of muscular relaxation, but again drawn to the side by fresh muscular contractions; tracheal and bronchial mucus mixed with blood flows from the mouth. The blood comes either from the bitten tongue or from the mucous membrane of the cheek, which is liable to hæmorrhage from excessive congestion and eventual rupture of the capillary vessels. The same cause may give rise to hæmorrhage in the brain and other organs, and the violence of the attack is sometimes so great that the muscles are torn to pieces.

The attack generally lasts from two to ten minutes. The whistling inspiration of the convulsed glottis, as it rapidly opens and closes, is followed by stertorous breathing, which after a time passes into tranquil respiration. The clonic convulsions are succeeded by a state of extreme prostration and relaxation of the whole body. Stupor is sometimes followed by a deep and restorative sleep, from which the little patient awakes quite well. At other times the fit is rapidly followed by a second, and many more, and death takes place from the deepening coma. The fatal result is then due to nervous exhaustion in consequence of too powerful discharges, or too deficient oxidation of the blood in consequence of the repeated attacks of asphyxia.

The convulsions may be general or partial, bilateral or unilateral, but in any case are more severe on one side than the other. For some hours or days after a paroxysm, there is a liability to a relapse, and the patient is in a similar state of nervous excitability to that manifested previously to the attack, though in less degree.

There is a special form of infantile convulsion called eclampsia neonatorum. It is of rare occurrence, and in the United States seems confined to the negro children at the South, to whom it is nearly always fatal. The convulsions attack the child within twelve days after its birth, and seem due to a congenital diseased condition of the nervous system causing cerebral hæmorrhage. Dr. C. P. Hart says that one case recovered under his care while taking Belladonna and Arnica.

Prognosis.—Our prognosis must vary with the cause, duration, and severity of the attack. If the convulsion occurs at the end of an acute fever or exhausting disease, our prognosis must be more unfavorable, so far as immediate danger to life is concerned, than if it took place at the beginning. If the attack is due to some local cause which we can hope to remove, such as worms, or undigested food in the stomach and bowel, we can offer better prospects of recovery than if the convulsions are central in origin, and dependent upon irritation of the pons, medulla, or cerebrum. Continuance of the convulsions and an increase of the coma, should cause an unfavorable prognosis, as might also the knowledge that the child is of a marked nervous temperament.

Pathology.—In our remarks upon the ætiology and symptoms of convulsion, we stated about all that is definitely known as to pathology. Hughlings-Jackson says that "we know scarcely anything of the pathology of children's convulsions; we do not know what is the change in the nervous system which produces this symptom, because in most cases the brain appears healthy after death." The post-mortem appearances are generally due to the mode in which death takes place, viz.; a quantity of dark blood in the brain and meninges, indicating death from asphyxia.

Treatment.—Much may be done to ward off an attack of convulsions by the proper treatment of the predisposing states of nervous excitability. All errors of diet, clothing and ventilation should be corrected. If indigestion or intestinal irritation exist, they should be removed as soon as possible. When convulsions are imminent as the result of an overloaded stomach or bowel, those organs should be relieved of their contents in an efficient manner. If dentition seems to be an important factor in the cerebral disturbance, it may be necessary to lance the gums. This operation is seldom necessary, but I cannot agree with those who will allow a child to go into a convulsion rather than resort to what experience has shown to be of benefit in some cases. When there is fever, restlessness, and inability to sleep, with much swelling of the gums, Gelsemium will generally ease the pain and produce sleep. The gums should be frequently rubbed with a napkin wet in cold water, and the forehead, face, and hands also bathed. This simple precaution will many times reduce the fever and nervous excitability, and ward off an attack.

Aconite, Belladonna, Coffea, Hyoscyamus, and Ignatia are frequently indicated. Ipecacuanha and Nux vomica will generally relieve the gastric irritation.

During the convulsion but little can be done with remedies, nor is there suitable opportunity to select carefully. The inhalation of a few drops of Amyl nit. seems in some cases to cut short the paroxysm, and in other cases fails entirely. The clothing should be loosened, and the child kept in as comfortable a position as possible. The use of hot water to the lower limbs and of cold water to the head will suggest itself at once, but it is doubtful what effect it has in shortening the paroxysm. If convenient, the child may be placed in a warm bath. Dr. Hart very properly warns against the use of the warm bath if the convulsions coincide with the eruptive stage of an exanthem, "and especially if the blood be very impure, as in malignant scarlatina this will be found hazardous." During the premonitory stage, the use of cold water compresses to the head, and bathing the wrists, will be of service.

The following are the general indications for a few remedies :

Belladonna.—This remedy is undoubtedly the most useful and often called for, but it should not be given in a routine fashion. The face is a deep red or else pale; the head is hot and throbbing; the eyes are injected, tremulous or staring, the pupils enlarged, and there is intolerance of light: there is drowsiness and starting from sleep as if frightened; great vascular erethism. The mouth and tongue are dry, and there is great thirst. The head is drawn backwards, and there is pain in the neck.

Hyoscyamus.—Congestion of the head; jerking and twitching of the facial muscles and the corners of the mouth; grating the teeth during sleep; red, sparkling eyes; face flushed, distorted or apathetic; convulsive jerks of single muscles, or of one hand, or a finger; the child starts at every noise.

Gelsemium.—This remedy is especially useful during dentition. Hart gives as indications: much nervous excitement, or else a stupid, comatose condition from which the child is roused with difficulty; pain, often severe, in the back of the head and neck; cerebral hyperæmia during dentition; child constantly boring its head into the pillow; delirious as soon as he falls asleep; excessive irritability; effects of the heat; the eyes are sensitive to light, cramps and spasms of the extremities.

Ignatia and **Nux vomica** are useful when the spinal cord seems the seat of the convulsive irritation, and the spasms are tonic in character.

Camph. brom. is recommended in cases where there is a condition of cerebral anæmia, as in cholera infantum. Dr. Hammond advises it for infantile convulsions due to teething, and gives it in one-grain doses every hour.

Other remedies to be borne prominently in mind are Cicuta, Cuprum, Ipecacuanha, Glonoine, and Veratrum album.

CONVULSIONS.

BY SAMUEL WORCESTER, M.D.

Synonyms.—Spasms, Fits.

Definition.—By convulsion, in a general sense, is meant any abnormal contraction of the muscles, taking place independently of the will, occurring in paroxysms, and generally attended with partial or complete loss of consciousness and diminished sensibility. The term *convulsion* is, however, generally confined to such contractions when they occur in the striped, voluntary muscles which are under the control of the cerebro-spinal nerves; the term *spasm* is used to denote similar abnormal action in the unstriped contractile fibres which are controlled by the ganglionic or sympathetic system.

Ætiology and Varieties.—Since convulsion is only a symptom and not a disease, it is difficult to state its causes except by naming all the diseases in which it is prominent.

While convulsions occur in persons of all ages, they are most frequent in infancy, being the immediate cause of death in the majority of children under five years of age. Boys seem more liable than girls to their attacks.

As all convulsions have a nervous origin, we naturally expect that heredity would exert a strong predisposing influence. We know that among the offspring of those who have suffered from neuralgia, epilepsy, drunkenness, hysteria, or any deeply seated neurosis, there exists an undue susceptibility of the nervous system which under the influence of sufficient cause manifests itself in spasmodic action.

Convulsions are divided, for convenience, into several classes. *Direct* or *local convulsions* are due to an irritation of a motor nerve at some point between its origin and the periphery; the irritation is generally due to the direct pressure of an effusion or morbid growth, and the convulsion is of limited extent. *Reflex* or *eccentric convulsions* are caused by some irritation of a sentient nerve, which is transmitted to the brain or cord with sufficient force to excite reflex motor action. Various bodily injuries, blows on the head, dentition, helminthiasis, extensive burns, excessive heat and cold, and gastric or intestinal irritation, all may cause reflex convulsions. *Centric* or *cerebro-spinal convulsions* arise from morbid irritation of the great nerve-centres, which may be due to inflammatory or organic disease of those parts, to softening, tumors, abscesses, hæmorrhage, anæmia or hyperæmia. Such convulsions are also termed *symptomatic*. Centric convulsions also result from faulty states of the blood by changes in its quality, as produced by the acute exanthemata, and by the retention of effete matters, as urea, bile, carbonic acid, etc. To these convulsions the term sympathetic is also applied. Convulsions are also called general, partial, unilateral and bilateral, according to the extent and portion of the body affected.

Convulsions in children will be spoken of elsewhere. Convulsions in adults are of two kinds: puerperal and non-puerperal.

PUERPERAL CONVULSIONS.—These occur at, or about, the time of parturition, and in the majority of cases are accompanied by the retention of urea in the blood; but it is not decided whether this uræmic condition is a cause or an accompaniment of the convulsion, or whether it is always present. The paroxysm resembles that of epilepsy in many respects, but there is no initial cry, and the loss of consciousness is more gradual and lasting. As a predisposing condition we find indications of venous congestion, albuminuria, and uræmia. The fit begins without warning, or after headache, restlessness, and difficulty in seeing. There is general convulsion of the body, including the facial muscles; the tongue is bitten, and there is frothing at the mouth; the jaws are tightly closed and the eyes rolled to one side. With each successive paroxysm the coma grows deeper, and there is no regaining of consciousness between the attacks. The convulsive period may extend over several days, during the whole of which time unconsciousness may continue. When death results, it is from increasing coma.

NON-PUERPERAL CONVULSIONS.—Those convulsions which occur in connection with epilepsy, apoplexy, sunstroke, or hydrophobia are quite severe in their manifestations, and will be described in the several articles upon those diseases. Convulsions also occur as the result of cerebral anæmia, and under the influence of certain poisons, such as lead, carbonic oxide, etc.

Pathological anatomy teaches us but little as to the extent or nature of the tissue-changes accompanying convulsive action. In some instances, tumors, or some other gross lesion, may exist for years without giving any indication of their presence; and on the other hand, in most cases of epilepsy, a disease in which frequent and frightful convulsions may occur for years, absolutely no changes are found, and we know little beyond the mere fact that a convulsion implies discharge of unstable gray matter. Althaus renders it very aptly when he says: "Given a state of convulsibility of the motor centre, any impression partaking of the nature of a moral or physical shock to special or general sensibility, whether perceived or not perceived, may give rise to a discharge of nervous force, or a *nerve storm*, which may be local or general; and when the convulsibility has reached a high degree, such a storm may even break out without any apparent exciting cause at all. The nervous centre may then aptly be compared to a storm-cloud, from which lightning may be drawn forth either through external collision or an excessive internal charge."

MUSCULAR ANÆSTHESIA.

BY SAMUEL WORCESTER, M.D.

Definition.—A loss of the feeling of muscular action, attended by irregularity, sluggishness, and diminished force of voluntary movement, but unattended by any necessary loss of cutaneous sensibility or by distinct paralysis (Reynolds).

Synonym.—Defective muscular sense.

The expression "muscular anæsthesia" implies the existence of a muscular sense; but the existence of peripheral nerves for muscular sensibility has not been clearly demonstrated. Lately, however, Arndt has found in the muscles of animals fine nerve-fibres which twine round the sarcolemma, and appear to end in it, and which he regards as the sensory nerves of muscle. Rauber holds that certain corpuscles found in the sheaths of muscles, in the periosteum, and in the vicinity of the joints, perform some, at least, of the functions which are generally attributed to the muscular sense. Axenfeld says that the muscles of animal life, beside the motor nerves, whose province it is to convey impulses from the nerve-centres, possess yet other nerves which are often bound up with, and mistaken for, the former, but which have entirely different functions. These are the sensory muscular nerves, whose very existence has been denied by many. These centripetal nerves, beside other uses, transmit to the brain the impressions caused by the alternate contraction and relaxation of the muscles, and thus inform us of the states of activity or repose of those organs; they also enable us to determine with great precision its extent and force.

The doctrine that there is a special sense which conveys to our sensorium a knowledge of the actions of our muscles was first advocated by Sir Charles Bell, who says: "When a blind man, or a man with his eyes shut, stands upright, neither leaning upon nor touching aught, by what means is it that he maintains the erect position? The symmetry of his body is not the cause. How is it that a man sustains the perpendicular posture, or inclines in due degree towards the winds that blow upon him? It is obvious that he has a sense by which he knows the inclination of his body, and that he has a ready aptitude to adjust it, and to correct any deviation from the perpendicular. What sense is this? for he touches nothing and sees nothing; there is no organ of sense hitherto observed which can serve him or in any degree aid him. Is it not that sense which is exhibited so early in the infant in the fear of falling? It can only be by the adjustment of the muscles that the body is balanced and kept erect. It must be a property internal to our frame by which we know this position of the members of our body, and what can this be but a consciousness of the degree of action and the adjustment of our muscles?"

Some physiologists believe that the cutaneous nerves are sufficient to acquaint us with the position of a limb or of the whole body, since it has been shown that the same nerve which supplies a muscle also sends a sensitive branch to the skin over it, as well as to the neighboring tissues.

Mr. G. H. Lewis, as quoted by Wilks, maintains that there is undoubtedly a muscular sense, and that this is as much a special one as any of the senses. The method, therefore, of testing its existence by the presence or absence of common feeling is of no value, for just as irritation of the optic nerve can produce no other effect than a flash of light, so contraction of a muscle can have no other result in the sensorium than that of feeling of effort, resistance, fatigue, etc. He also argues that the distinction between mobility and sensibility is not a real one, as the two are intimately associated in the various operations of the body, that motor and sensory nerves are essentially alike, as both are equally capable of conveying sensory impressions or motor impulses; also, that in all probability the so-called motor nerves not only excite the muscles to action, but produce at the same time an impression on the sensorium corresponding to the state into which they are thrown. In his own words, "All feeling is a complex of passive reception and active discharge. There is, therefore, a justification for the establishment of a special and distinct class of sensations produced by muscular movements, and to these the term *muscular sense* is appropriate. Such sensations are complexes of neuromuscular active and passive sensibilities; and although their seat is neither in muscles nor in nerves, but in the sensorium acting on and affected by nerves and muscles, we have the same ground for including the motor nerves among the essential conditions of production of muscular sensations as for including the optic and auditory nerves among the essential conditions of production of sight and sound *sensations*."

When the muscular sense is lost, the movements of the muscles fail in precision and force. The sense of sight is made, in a degree, to supply the deficiency, and if the eyes are kept upon the limbs the patient seems able to execute movements normally; but, without looking to see, the patient does not know the position of his limbs; and even when he has voluntarily assumed any attitude or position, he swerves from it if his attention be directed to some other object than his own limbs, as in a case mentioned by Sir Charles Bell, where a woman who had lost sensation of one arm, but not the use of it, could carry her child on her arm as long as she looked at him, but as soon as she directed her eyes away, the arm would fall.

This condition may appear as the precursor of paraplegia, and also as a symptom in hysteria, locomotor ataxia, etc. Occasionally it exists alone as the result of taking cold, as in a case reported by Reynolds.

As may be inferred from the preceding remarks, we know little of the causes or pathology of muscular anæsthesia, and our treatment must be determined by accompanying symptoms.

PROGRESSIVE MUSCULAR ATROPHY.

BY SAMUEL WORCESTER, M.D.

Synonyms.—Wasting palsy, Paralysis atrophica, Myopathic paralysis.

Definition.—A chronic disease marked by progressive wasting of the voluntary muscles, independent of any antecedent motor or sensory paralysis, and attacking successively individual muscles and groups of muscles.

Ætiology.—Those authors who accept the myopathic theory of the disease, supported so strongly by Friedreich, believe with him that the predisposing diathesis consists in "a nutritive and formative weakness of the muscular tissue, causing an increased tendency to irritation and degenerative disturbances of nutrition in the said tissue." The believers in its neurotic origin will bring forward many facts in favor of their view, and support their theory by noting the frequent complication of this disease with the other neuroses. Leaving this question in abeyance until we come to speak of the pathology, it is certain that heredity is one of the strong predisposing causes of wasting palsy. Dr. Roberts notes heredity in thirteen cases out of sixty-nine collected by him, and Nannyn gives the history of one family through six generations, where out of thirty-one persons, thirteen were attacked. Trousseau mentions a family in which the great-grandfather, grandfather, father, and son suffered from the disease. Dr. Hammond prints in full the history of a family, so many of whose members were sufferers that the disease was known as "the Wetherbee ail."

Men seem much more liable to the disease than women; this difference is partly due to the greater muscular exertion required of the men. Out of 176 cases collected by Friedreich only 33 were women, and Roberts states that of 99 cases, 84 were men and only 15 women. Those from twenty-five to forty years of age are most frequently attacked, but when there is a strong hereditary tendency it will occasionally attack children.

It is often impossible to decide as to the immediate exciting cause, but immoderate muscular exertion, exposure to cold and dampness, and sexual excesses are the most prominent.

Symptoms.—The principal symptom, and the one from which the disease takes its name, is the gradual wasting of certain muscles, resulting in weakness and deformity. If the disease begins in one of the arms, a feeling of weariness on exertion, and a difficulty in executing delicate movements, are first noticed. If in the lower limbs, walking tires one. These symptoms continue and increase until, after a time, an examination is made, when it is found that the muscles have begun to atrophy. In some cases, after exposure to cold or dampness, pains of a rheumatic or neuralgic character are felt, and it is said that in such cases the wasting of the muscles progresses more rapidly than in those where no pain is experienced.

In the majority of cases fibrillary or fascicular contractions of the affected muscles are present from the initial stage of the disease until the muscle is wholly wasted. Dr. Hammond says this symptom was prominent in every one of his fifty-two cases. These vibratory tremors or quiverings occur spontaneously, or may be excited by active or passive motion, rubbing, tapping, exposure to the air, or electricity. They may be the earliest indication of the progress of the disease into muscles previously untouched.

The disease generally begins in one of the upper extremities, usually the right; and whether the upper or lower extremity is first affected, the tendency is for the opposite member to be next involved. According to Friedreich, out of 146 cases the disease commenced in 111 in the upper extremity; in 27 in the lower limbs; and in 8 in the muscles of the loins.

Eulenberg states that the external interosseus of the right hand is the first muscle affected, but most writers (Hammond, Ross, Friedreich, Roberts) say that the disease usually begins in the muscles composing the ball of the thumb, viz., the adductor pollicis and opponens pollicis, while the extensor, flexor, and abductor muscles do not suffer until later. The muscles of the arm and forearm being spared for a time, the deltoid is next attacked, and then the trapezius and serratus magnus. The disease now returns to the arm, and causes atrophy of the biceps and triceps, with resulting inability to use the arm. As the counteracting strength of the wasting muscles gradually lessens, there is increasing inability to execute movements, and marked deformities result, as well as emaciation. The furrows between the metacarpal bones are deepened by the wasting of the external and internal interossei muscles, the thenar and hypothenar eminences are flattened, and the flexor tendons are brought prominently to view by the wasting of the muscles of the palm of the hand. From the resulting distortion the hand resembles the claw or talon of a bird, and has received the name *main en griffe.* In some cases the arms hang helplessly by the side close by the body, while various deformities of the shoulder, club-foot, and scoliotic and kyphotic distortions of the spine will follow atrophy of the muscles of those parts of the body. When the lower extremities are involved, we notice the same loss of muscular power and atrophy, but the resulting deformities are not so frequent nor severe as in the upper extremities. The muscles of the chest, face, and larynx are occasionally implicated. Dr. Hammond presents a woodcut, copied from Friedreich, representing the case of Ludwig Bessing, forty-five years old. Almost all the muscles of the body, trunk, and extremities were in a state of extreme atrophy, the only exceptions being found in the left forearm. The disease had remained stationary for many years, during which period there were strong fibrillary contractions.

When a muscle once becomes affected, the tendency is for the morbid process to continue until the whole muscle is destroyed, but in some cases we meet with remarkable exceptions, when a single muscle, or even parts of a muscle, may escape, and even preserve its normal motor power. Duchenne reports a case where all the muscles of the hand and forearm were completely atrophied with the exception of the supinator longus, which was intact; and Dr. Ross reports a case where the middle third of each biceps muscle was completely atrophied, while the upper and lower thirds maintained a fair volume.

Reflex movements are often exaggerated during the early stages, especially in the lower extremities. The electrical reaction of the atrophied muscles under the use of the faradic current becomes less and less as the wasting goes on, and it is only in the final stages that the " reaction of degeneration " is manifested under the use of the continuous current.

Diagnosis.—Progressive muscular atrophy may be mistaken for the various forms of spinal paralysis occurring in infants and adults, for glosso-labio-laryngeal paralysis, and for locomotor ataxia.

From paralysis our diagnosis should be easily made when we note that wasting palsy is marked by atrophy advancing from muscle to muscle, and not attacking a whole limb at once; that there is no true paralysis, but a gradual loss of strength, subsequent to and dependent upon the wasting-away of the muscular tissue.

Glosso-labio-laryngeal paralysis presents no atrophy of the muscles, and the tongue lies motionless in the mouth, while in those cases of wasting palsy in which the tongue is involved, that organ is marked by knots and depressions.

Some cases of locomotor ataxia may present partial atrophy of a limb, but it will be general in character and not confined to isolated muscles.

Pathology and Pathological Anatomy.—Anatomical changes are to be found in the muscles, spinal cord and nerves. The morbid process in the former begins by a proliferation of the interstitial connective tissue of the internal perimysium among the single primitive bundles. This is followed, according to Friedreich, by swelling and multiplication of the muscular corpuscles, together with proliferation of their nuclei, and the transverse stripes appear cloudy and granular. Wasting of the muscular substance keeps step with increase of the interstitial tissue, a process which leads to fibrous degeneration of the muscle until this latter appears as a shiny, tendinous cord. A development of fat occurs in some instances within the hyperplastic connective tissue, causing a pseudo-hypertrophy of the muscle, and marking the essential features of the disease.

Cruveilhier first called attention to the fact that the anterior nerve roots, especially of the cervical region, were generally atrophied, and his observations have been confirmed by numerous writers. Quite recently, a Dr. Frosier has recorded the post-mortem appearances where a young man died with universal atrophy of the muscles, which began in one limb, and then progressed in the usual manner until the chest was involved. He found on examination of the spinal cord an entire absence of the large branched cells of the anterior cornua, a few atrophied ones alone remaining, or some granule-cells replacing them. The lesion was almost limited to the cervical region. The anterior spinal roots were atrophied, but not the posterior, and the spinal accessory and lingual were included in the atrophy. The anterior nerve roots have, however, been reported as normal in a few instances even by competent observers.

In 1855 Valentiner discovered a central softening of the gray substance in the neighborhood of the three lowest cervical and three upper dorsal nerves. Luys first called attention to the importance of the changes in the gray substance. He found that in the neighborhood of the cervical enlargement the ganglionic cells of the anterior horns had almost disappeared, and were replaced by a granular exudation containing oil-globules. The degeneration affected principally the left anterior cornu corresponding with the seat of the muscular atrophy, and the left-sided atrophy of the anterior roots.

At present there is essential agreement that the foregoing appearances are the principal ones to be discovered on examination, but there are two theories advanced to account for the symptoms of progressive muscular atrophy. Friedreich holds that the disease is essentially muscular in its nature, and that the changes in the nerve roots are not constant, and, when present, are only secondary in order of development. Charcot is the leading advocate of the neuropathic theory, which finds the most adherents and seems best to account for all the conditions.

According to the neuropathic theory, the disease is one of the spinal cord, and the atrophy is due to the progressive changes, primarily of an irritative character, chiefly affecting the ganglion-cells of the anterior horns of the gray matter, from where the motor roots emerge, and which preside over the nutrition of the muscles. The number of wasted muscles is proportionate to the degree of change found in the anterior horns. Dr. Ferrier shows that the progress of the disease, beginning in the muscles of the hand, and then spreading to the flexors and pronators until the "*main en griffe*" is produced, is quite in accord with what would happen if the eighth cervical and first dorsal nerves were affected. The triceps would be the last muscle affected, because its centre would be represented in the upper branches of the plexus. The disease advances, as would the progress of degeneration in the cord, from below upwards, or *vice versa*.

Dr. Sturge says that, as the muscles are affected in groups, and not according to supply of nerve-trunks, it shows a primary cause in the cord. The centres here represent certain physiological movements; for example, the biceps, brachialis anticus, and supinator are affected together, because the flexors are ruled over by the same centre in the cord.

In acute disease of the anterior cornua, a large mass of the muscles is affected; in chronic disease individual cells are picked out, and the affection of muscles comes on by slow degrees. (Wilks.)

Prognosis.—The prognosis is unfavorable, as but few patients fully recover. Much may be done, however, to arrest or delay the progress of the disease so long as there is any response to electricity. When death results, it is from decubitus and exhaustion, or from bulbar paralysis.

Treatment.—Argentum nitr., Plumbum, and Strychnia are the remedies from whose use the best results may be obtained. As a rule, however, the case does not come early enough, or remain long enough under treatment, for us to judge how much remedies will do under a fair trial.

Electricity and medical gymnastics show excellent results, though often the improvement will be only temporary. The gymnastic treatment recommended in the article upon Writer's Cramp, may be used for this disease, and Eulenberg speaks of a case cured by massage. Both the faradic and galvanic current are recommended, and each is suitable for certain conditions and cases.

METALLIC TREMOR.

BY SAMUEL WORCESTER, M.D.

Of the different metals which, if taken into the system for a long time, cause marked disturbance of the motor nerves, two will be noticed here, namely, LEAD and MERCURY.

LEAD TREMOR OR SHAKING PALSY.—*Synonyms.*—Tremor saturninus, Paralysis agitans saturnina.

Tremor is occasionally noticed as a result of lead-poisoning, both as a persistent symptom and as the forerunner of complete palsy. Among the symptoms of lead-poisoning which indicate disturbance of the nervous system, the following are the most prominent, named in the order of their frequency: colic, arthralgia, paralysis, and encephalopathy. Of these we are to consider briefly the tremor, which is a modified form, or early stage, of the paralysis.

Brockman first called attention to the fact that among the workers in the lead mines of the Hartz mountains there was to be observed a peculiar trembling analogous to mercurial tremor, which he describes as consisting in oscillating spasmodic contractions of the muscles and consequent tremulous motion in various parts of the body. While weakness of the extensor muscles, and even paralysis, is frequently met with among those exposed to the fumes of lead, this peculiar tremor must be of rare occurrence, for most authors simply follow Brockman's description, and others omit to mention the tremor at all. In Salem, Mass., there are two quite extensive mills engaged in the manufacture of white lead and lead pipe, and I have had under my care at different times persons suffering from lead-colic and paralysis, but I have neither seen nor heard of a genuine case of the tremor, except as marking the early stages or slighter forms of the palsy. Dr. Allan McL. Hamilton says a form of tremor has been found as a rare symptom, and then quotes Brockman.

After an acute attack of lead colic, or during the existence of a chronic condition of plumbism, there will be a weakness of the extensor muscles of the hands, sometimes confined to one muscle. This will produce a shaking and trembling akin to that noticed in paralysis agitans. It is also noticed after great excitement or fatigue, and disappears in a few days, but at each recurring attack becomes more and more severe and of longer duration, and terminates in wrist-drop and paralysis.

Iodide of potassium, Nux vomica, Opium, and Zinc are the remedies of most value in the trembling or paralysis caused by lead-poisoning.

The use of galvanism, both in the form of the continuous and induced currents, has given excellent results. Dr. Handfield Jones reports that his cases have derived marked benefit from the use of electric baths, and that lead has been found in the bath after the water has been used a few times.

MERCURIAL TREMOR.—*Synonyms.*—Mercurial palsy; Paralysis agitans mercurialis.

When volatile mercury has for a long time been inhaled by the lungs or absorbed through the skin, a condition is produced called Hydrargysm or Mercurialism.

This disease was formerly much more frequent than now, owing to the improved processes of manufacturing; even now it is occasionally met with among those employed in the quicksilver mines, or in occupations which bring them into contact with mercury in a finely divided or volatile state. Instances are on record where mercurialism has resulted from wearing artificial teeth, mercury being used in preparing the rubber plate. One such case occurred in my own practice. Salivation is sometimes caused in highly susceptible persons by the use of amalgam as a filling for teeth; and Dr. Hammond reports a case of mercurial tremor produced in a young lady by the use of a solution of corrosive sublimate as a cosmetic to remove pimples from the face.

Dr. Ross says that the symptoms of chronic poisoning by mercury begin by neuralgic pains and numbness. These sensory disturbances are accompanied, or soon followed, by slight tremor, which may for some time remain limited to the hands and arms. The tremor, like that of disseminated sclerosis, only reveals itself when the patient makes a voluntary effort, but at a later period it persists during repose or even during sleep. "When the patient assumes the erect posture, the lower extremities tremble, especially at the knees; the head and neck are maintained in a state of constant oscillation; the lips are tremulous; the utterance becomes broken and indistinct, mastication is rendered difficult; and even respiration becomes irregular and labored. The muscles of the eyeballs are said never to be affected. Muscular weakness is associated with the tremor, but distinct paralysis seldom occurs." After a time the tremor increases in severity and persists during sleep, and as a result the patient becomes weak and emaciated. Christison says that there is a peculiar brown tint of the whole body, and in the advanced stages of the disease headache, sleeplessness, and impaired memory are present.

Treatment consists in placing the patient in proper hygienic surroundings, and using the Iodide of potassium internally. Attempts should be made to remove the poison from the system by the use of hot sulphur-baths. Galvanism may be applied to the affected muscles.

INSANITY.

BY S. LILIENTHAL, M.D.

As insanity is a negation, we may well ask "what is sanity?" All mental activity is a corporeal function, and part and parcel of our bodily existence. It is now generally acknowledged that the brain is the organ in which resides all mental action. Krafft-Ebbing (Psychiatrie) remarks that individual experience and observation teach that every process of thinking is somewhat exhausting to the brain, and whenever the mind is overworked there appear such symptoms as sleeplessness, hyperæsthesia of the senses, headaches, dizziness, irritability, and a desire for mental rest.

In considering the functions of the healthy brain, we see: (1) that it receives sensations through the senses from the outer world, and retains them or allows them to vanish unperceived; (2) that it retains these impressions, and is able to reproduce them in subjective sensations and ideas; (3) that it acts upon these impressions; (4) that the brain is therefore the organ of perception, cognition, and will-power, the medium of all the higher emotions and feelings, and possesses the faculty of understanding, of memory, judgment, reflection, induction, imagination, and many others of the same class.

When all these functions in an individual are in order and work together harmoniously, the world considers such a person of sound mind and responsible for his actions. And yet, easy of solution as the definition of insanity appears, a satisfactory definition of the term has never been given. Even the definition made by Judge Edmonds, of New York (Worcester, *Insanity*, p. 11), does not cover the whole ground.

He considers a person sane: (1) whose senses bear truthful evidence; (2) whose understanding is capable of receiving that evidence; (3) whose reason can draw proper conclusions; (4) whose will can guide the thought thus obtained; (5) whose moral sense can tell the right and wrong growing out of that thought; (6) whose act can, at his own pleasure, be in conformity with the action of all those qualities. The possession of all these constitutes sanity; the absence of any one of them insanity. Hammond (*Edit.* 1883, p. 265) still defines insanity as a psychic manifestation of brain disease unattended by loss of consciousness.

"*Mens sana in corpore sano.*" To keep mind and body in a healthy condition, certain requirements are necessary: (1) Since normal blood can only be manufactured from food suitable in quality and quantity to the wants of the individual, everything which might vitiate the blood ought to be avoided; (2) light and fresh air to oxygenate that blood and to keep our senses in good working order; (3) recuperation for renewal of work through rest and sleep.

Sleep is the natural and healthy, but temporary and periodical, suspension of the functions of the organs of our senses as well as of those of the voluntary muscles, rendered necessary for the reparation of our vital powers; the length of our sleep depends on the antecedent waste and the rapidity of repair. Imperfect sleep causes dreams, according to Dugald Stewart, that condition of sleep in which we have nearly, or quite, lost all volition over the bodily organs, but in which our mental faculties retain a partial degree of activity.

Life is but an idle dream, says the poet; the alienist responds: insanity is but a waking dream. Winslow, in his great and masterly work *On the Brain and Mind*, truly says: "The madman's conduct is generally in correspondence with the delirious suggestions of his disordered, unbridled, and uncontrolled fancy. How closely do the phenomena of dreaming resemble the automatic operations of an intellect obscured by insanity. How distressing is the lesion of the will, how painful the insane uncontrollable impulses, how agonizing the madness of the emotions, the aberration of the ideas, the exaltation and perversion of the passions. How often is all idea of duration apparently obliterated from the mind of the insane during the continuance of the disease, the patient appearing after a long siege of sickness to awaken, as it were, from a phantastic and troubled dream."

The ætiology of mental diseases in general is the same as that of other cerebral and nervous affections. Insanity is found among all nations, in all ages, and in both sexes. Is civilization to blame for its spread? If so, we must take this curse along with the blessings which it bestows. Among individual predispositions, heredity in its widest sense takes a foremost rank. The neuropathic constitution often leads to other evils, as drunkenness, sexual excesses, and too often a criminal act is only the result of hereditary influences. Poor blood, poor nerves, and anæmia, qualitatively more than quantitatively, are most frequently observed in our insane asylums, though we may occasionally meet a temporary local hyperæmia.

Such neuropathic persons are very apt to allow their emotions to run riot, and there is no more frequent cause of insanity than depressing states of the mind, be it anger, anxiety, disappointment, fright, or terror. We do not believe that even excessive mental exertion *per se* produces insanity; it is the worry usually connected with it which disarranges the balance-wheel and leads to insanity.

No wonder that sleeplessness and mental disaffection are the forerunners of the approaching mental troubles; were they more frequently heeded, a calmer state of mind would result and the approaching storm be prevented. These storm signals should be heeded, for prevention is better than cure.

Before classifying mental diseases, we must understand the meaning of several expressions frequently used in the study of alienations; thus (Hammond) an *illusion* is a false perception of a real sensorial impression from central derangement, due to a morbid condition of the perceptional ganglia, and the unreal nature of which is clearly recognized by the person—therefore objective.

A *hallucination* is a false perception without any material basis, creative in its origin—therefore *subjective*. Especially frequent are hallucinations of hearing with integrity of the intellect.

A *delusion* is a false idea, of the falsity of which the patient cannot be persuaded, either by his own knowledge and experience, by the evidence of his senses, or by the demonstrations and declarations of others —therefore *intellectual*.

As soon as an illusion or hallucination becomes a delusion, a reality to the patient, so that he is liable to act upon that belief, we may consider the patient insane. We meet especially three great groups of delusions, namely, delusions with ideas of grandeur, of diminutive smallness, and of persecution; the two latter may be so combined that he who accuses himself as a reprobate and a delinquent, still complains of the persecutions by others to which he is exposed. Neither the character of the delusion or hallucinations, says Weiss (*Compendium der Psychiatrie*, 31), nor their combinations, may be considered characteristic of any particular mental disease; they are not secondary sequences of a preceding morbid psychical state, as formerly taught, but rather the foundation of an alienation which took place in the diseased brain.

The classification of mental disorders is as manifold as there are authors on this great branch of medical science. Taking the functions of the mind, perception, cognition, and will-power, as his guide, Hammond very practically describes perceptional, intellectual, emotional, volitional, compound, constitutional insanities, and, finally, arrest of mental development. As the intellect must be involved to make out a case of insanity, Hammond's first division is of questionable value.

INTELLECTUAL INSANITY.

Here the delusions take the front rank, and they may produce mental exaltation or mental depression, but its development is very slow. For some time the patient complains of sleeplessness, headache, and other bodily symptoms, and the careful observer can notice an excessive mobility and restlessness before the disease is fully developed.

In *intellectual monomania with exaltation* the mental symptoms gradually lead to the development of delusions which may be based on dreams, on illusions and hallucinations, or which may arise from purely imaginary premises not connected with the senses, and mostly take on the character of grandeur (Christ, emperor, president, inventor, etc.). Such a patient is always ready to defend his imaginary rights and to quarrel with those who dispute his claims to distinction, though a slight recognition of the truth of his delusion suffices to restore him to equanimity. Sometimes his delusions relate to a change of sex, which is regarded with great pride and satisfaction, or to changes which he supposes took place in various parts of his body. Remissions are not very common, and intermissions are still rarer. During its course, there may be intercurrent attacks of extreme excitement with active delirium, characterized by great volubility, incoherence, and excessive mobility.

Intellectual monomania with depression.—It may arise suddenly or may be preceded by prodroma. The delusion consists in ill-defined ideas that people are conspiring against the person in whom they exist. He therefore becomes suspicious, and tries to protect himself and his property. Illusions and hallucinations may be present at a very early period, especially those of hearing. In other cases there is a great indescribable fear of the future, a dread of some misfortune. Sometimes such hallucinations and delusions lead them to accuse themselves of having perpetrated various crimes.

Chronic intellectual mania is the usual termination of both the preceding forms. Its symptoms are the presence of delusions, a defective power in the association of ideas, incoherence, and mental weakness. It may be the primary disorder, which may be preceded by wakefulness, morbid dreams, illusions and hallucinations, and an unnatural state of mental and physical excitement, or it may be secondary; and in most cases there is a tendency to a still lower form of mental derangement—dementia.

Reasoning mania (Mania without delirium of Pinel).—Overbearing egotism, regardless of the feelings and rights of others, with desire for notoriety; hence such patients try to play the reformer, the redresser of all kinds of possible or impossible wrongs, or are incessant office-hunters. They are more influenced by the emotions than by the intellect, which, being deranged, is not under control, and the facility for passing from one state of feeling to another, both of which may be manifested by intense passionate perturbation, is a striking peculiarity of reasoning maniacs. They are prone to acts of violence from slight exciting causes, and these may be perpetrated either in the heat of passion or after such deliberation as they are able to give to any subject. Generally they are directed against those whom they suppose to have injured them, or they may be committed solely for the purpose of gratifying the morbid feelings of pleasure which they experience at the sufferings of others. A proclivity to reasoning mania may be congenital, or acquired as a consequence of other diseases, or of injuries, or as the result of degenerating physical or mental factors. There is no tendency to degenerate into dementia, but it may develop into the characteristics of general paralysis of the insane (Guiteau).

Intellectual subjective morbid impulses, the occurrence and recurrence of an idea which is known to be false, but which by its persistency causes more or less mental derangement, and the logical consequences of which are restricted to the individual in whom it exists, or (2) the tendency to the recurrence of an idea or of a mental image which, though true enough, and probably at some anterior period entertained with pleasure, now wearies with constant reiteration, may give rise to secondary mental and physical disturbance (a localized hyperæmia of the brain, insomnia, horrid dreams which often persistently remain vivid in daytime).

Intellectual objective morbid impulses.—An idea occurring in the mind of a person contrary to his sense of what is right and proper, and urging him to the perpetration of an act repugnant to his conscience and wishes. An impulse of this kind (Zwang's-Vorstellung) may be sudden, and may exhaust itself by a single occurrence, or it may be continuous, lasting, with more or less intensity, for weeks, months, and even years. It may then disappear without its ever having been fulfilled, or it may be acted upon, and may then either be repeated or vanish, or it may result in the patient passing into a more generalized type of insanity. According to their character, intellectual objective morbid impulses have been classified as homicidal, suicidal mania, etc. It is more apt to occur in persons who possess what has been called the insane temperament.

EMOTIONAL INSANITIES.

Emotional insanities are those forms of mental derangements in which the aberration of mind is chiefly exhibited by disturbance in the normal action of some one or more of the emotions.

Emotional monomania refers to aberration of a single emotion. Its subjects, usually before the occurrence of the most pronounced symptoms of the affection, evince more or less disturbance of the emotional system, either as a whole or in part. Here we have erotomania, the emotions of pride and vanity, of avarice, of jealousy, of nostalgia, anger, love of gambling, each of which may, through excess, become insanity. Morbid fears, in consequence of a disordered state of the nervous system, without the existence of any actual cause, may lead to mental derangement. There is constant apprehension that something fearful will happen. Such an emotion of fear may produce intellectual confusion and, perhaps, undefined delusions, and when the latter take hold of the patient, suicidal impulses may arise, though this is the exception. The prognosis of this panophobia is good. The disease is much more frequent in women, and appears to be sometimes connected with ovarian disorder.

There are other fears in which the emotion is manifested in a special, determinate and restricted way, as agoraphobia (fear of spaces), claustrophobia (terror of closed places), astraphobia (fear of lightning), monophobia (fear of being alone), anthropophobia (fear of society), mysophobia (fear of pollution), and a great many more. There are also special morbid fears relative to certain diseases, lyssophobia, syphiliphobia, spermatophobia.

Emotional morbid impulses (moral insanity of Prichard), having an emotion for their factor instead of an idea. Among such impulses may be counted kleptomania, the love of stealing as a pleasure, though caring nothing for the article stolen; pyromania, an abnormal manifestation of the love of destroying, often met with in young persons, the function of menstruation making pyromania more frequent in women; homicidal monomania, without malice or cupidity, or any other emotion, save that of the gratification of their passion for killing; or the emotional impulse to the perpetration of suicide, though there may be no earthly reason for the act of self-destruction. In some cases there is a terrible contest in the mind of the person, and the intellect may come out victorious, whereas in others the will is overcome, resisting all arguments and other emotions, and the attempt is made.

Melancholia, the lypemania of Esquirol, a painful mental state, evincing itself by depressive negative effects; Schuele calls it a painful hyperæsthesia with intellectual and motory inhibition. Mendel (Eulenburg, viii., 66) differentiates three stages: (1) Stadium depressionis, suddenly or gradually appearing. We meet here again that fear without any reason for it. There is a certain indescribable weariness in the patient which incapacitates him from all efforts to overcome that anguish, and as every trifling impression causes pain, as every trifle puts him out of humor with himself and the outside world, he prefers solitude to society. The essential character of all this delirium is still of a passive nature, an inward suffering, but outside of it his mind often becomes a perfect blank. Hence suicide in such cases may be considered a liberation from torture, especially as long-continued sleeplessness or sleep full of frightful dreams have already preceded for some time this stage of mental depression. No appetite, tardy urination and defecation, palpitations with the characteristic præcordial anguish, neuralgic headaches, etc. (2) Stadium melancholicum. Hallucinations, especially of hearing, are the grand characteristics of this stage, varying according to education and caste. We must differentiate melancholic passion and action. In the former the patients remain misanthropic, the features express the inward suffering and anguish, and it is nearly impossible to get a decided answer, they only sigh and moan. Sometimes they remain seated for hours in the same place, their mind occupied with their hallucinations, and they have to be urged to respond to the calls of nature, though they obey willingly to whatever they are bid to do. In melancholic action, on the contrary, their anguish gives expression in words and deeds, and unasked they recite their delusions and hallucinations. Excessive restlessness; they cannot remain indoors, and fly away. A higher degree of active melancholia is the furor melancholicus, often with destructive tendencies, the highest expression of their frightful hallucinations. Sleeplessness is also prevailing here, and it is astonishing how night after night can be passed by them without sleep. (3) Stadium decrementi. Fear and anguish gradually diminish, after having lasted for months; the patient, in favorable cases, begins to doubt the truth of the hallucinatory delusions; sleep and appetite return, and with it a desire to commune with the world, and to work. A return of former bodily ailments, as migraine, may also be considered a favorable sign; or the disease passes over in a secondary incurable dementia, during which former hallucinations still may prevail, but, as it were, under a cloud.

Varieties of melancholia are: (1) Simple melancholia sine delirio. The patient is fully conscious of the depressed state of mind, but is unable to rouse himself, or, in other words, the disease remains in its first stage. (2) Melancholia attonita cum stupore. During the first and second stage the patient passes into a state of katatory, the tonicity of the muscles becomes altered, and the severity of the hallucinations is overpowering to such a degree that not a muscle can be lifted nor a word spoken. It may suddenly change into active melancholia, and suicide be the consequence. (3) Melancholia periodica. The intervals are not free, or we meet during it mental hebetude and irritability, weakened memory, and a deficiency in the energy of action.

Hypochondriacal melancholia is characterized by the existence of morbid fears relative to health, mental or physical, by intense depression of mind, and by the presence of illusions, hallucinations, and delusions relative to the condition of the body, or of one or more of its organs. The disease almost always appears at adult age, especially in persons of hereditary neuropathic constitution, who therefore become easily exhausted. An undefined, yet vivid, feeling of illness torments and annoys the patient in an obscure manner. All sensations are watched and seriously commented upon, and analyzed in the sense of the ruling gloomy and anxious frame of mind, and he often expresses his fears with an exaggeration in the most graphic and ludicrous manner (Worcester). Dubois says the first period of hypochondriacal alienation is characterized by the existence of purely mental symptoms; in the second period there is the same mental condition, but there are functional troubles of various organs of the body, and in the third period we may find lesions of the organs either in the nature of congestions, inflammations, or other more serious affections. Real disease is therefore induced, and the symptoms are such as are peculiar to the existing lesion.

Hysterical mental alienation.—Liebermeister says: we deal here with disturbances in the sphere of emotions, dispositions, and impulses, manifesting themselves in most diverse complaining, for which we cannot detect a corresponding local disease or an abnormal irritation of peripheral nerves; it is really a moral crookedness with excessive egotism, full of hyperæsthesia or anæsthesia, full of spasm or palsies: and he concludes this splendid essay (N. A. J. of H., Nov., '83) with the words: the patient must be convinced that in her own will-power lies the great secret of the cure, and that the physician can only aid her in her endeavors. Although most cases of hysterical insanity occur in women, still many cases in men have been reported. The symptoms do not vary essentially from those met in women, though, perhaps, they do not reach the same degree of intensity.

Epidemic Insanity.—More of historical interest, as demonomania, theomania, lysanthropy (changed to a wolf or other animal), which took their sources from emotional superstition; still there are cases on record, even in our own days, where one person infected others with his delusions. This is the folie à deux or folie imposée of the French.

VOLITIONAL INSANITIES.

Morbid volitional impulses may cause the perpetration of acts which are dictated neither by an idea nor by an emotion. They are, therefore, motiveless, and are often perpetrated against the judgment and the desires of the subject, who is perfectly conscious of what he is doing, but is unable to resist the sudden impulse, and when the act to which the individual is blindly impelled is committed, the normal balance between the several mental faculties is at once restored. It may exhibit itself in many ways, constituting instances of homicidal or suicidal mania, kleptomania, pyromania, etc. It often happens that with the performance of a single act, due to morbid volitional impulse, the tendency is exhausted, and may never reappear (transitory fury).

Aboulomania, paralysis of the will, or inability to exert the will, to come to any decision, whereby the other faculties may not be affected. It may happen only in some particular direction, as dressing or undressing, and such patients may be able to perform their wonted duties well enough, but their will-palsy protrudes itself as soon as deliberation to perform the act is necessary.

COMPOUND INSANITIES.

Acute mania is a functional cerebral disease, characterized by a morbid acceleration and hyperexcitability of the intellectual and moral faculties. In typical cases we find four stages: 1. Stadium initiale, gastric disturbances, inappetency, constipation, dulness of head, general malaise, insomnia, mental indisposition, with motory restlessness and irritability. 2. Stadium exaltationis, so often mistaken for a return to the normal state, because the patient feels and looks better. The delirium (a mental darkness in its first stage) in mania has much of the character of frolic and boisterous excitement. Such patients like to hear themselves talk; try to be witty and teasing; there is a perfect flight of ideas, but no stability; in their exuberant feeling of health they are proof against heat or cold; their appetite is enormous, but they can also do without food; and sexual orgasm, even to immoral freaks in speech and deed, is not uncommon. Hallucinations of sight are frequent, less so of the other senses. 3. Stadium furoris. The incoherent delirium and the motory restlessness may lead to maniacal actions. 4. Stadium decrementi. Refreshing sleep hints toward recovery, the hallucinatory delusions lose their power and gradually disappear, and the patient acknowledges his former insanity; or it passes into a secondary incurable dementia. Many varieties of mania are enumerated, as hypomania, an abortive form of mania, which never rises to the dignity of furor.

Mania hallucinatoria, where the prevalence and rapid change of the hallucinations, with extreme restlessness, easily lead to maniacal actions.—*Mania gravis*. In rare cases, after a short initial stage, the stadium furoris sets in with full force. Hallucinations of taste may lead to total refusal of food; the pulse is very rapid; temperature 104, or over; involuntary defecation and micturition, with growing weakness; the deliria lose their force, and the patients die in collapse. Somatic diseases are often the foundation on which the mania is reared. *Mania periodica*, with impure intervals and decrease of mental energy.

Hebephrenia, the insanity of pubescence. The depression of spirit at that age often leads to attempts at suicide. Their delusion is that their efforts are not appreciated, that everybody misunderstands them, their fear and hate predominate, they run away from home, and gradually their mental functions deteriorate. Heredity and masturbation are often the responsible causative factors.

Circular insanity, folie circulaire, is characterized by alternations of depression and excitement, each period being entirely distinct from the other. This species of insanity may appear as an isolated accession, or the seizures follow each other in an intermittent manner, or they occur without intervals between the paroxysms of which each may last several months. It is much more common in women than in men, and the prognosis is more than doubtful.

Katatonia.—Kahlbaum describes it as a form of insanity, characterized by alternate periods, supervening with more or less regularity, of acute mania, melancholia, and epileptoid and cataleptoid states, with delusions of an exalted character, and a tendency to dramatism. This affection is far more often observed in males.

Primary dementia is a form of mental derangement characterized by the more or less complete weakness of the faculties of the mind, not secondary to any other form of insanity, but beginning as such in a person previously sane. It usually follows a state of exhaustion, or after some severe mental shock in persons weighed down by heredity. In persons given to masturbation, or insufficiently nourished, after excessive loss of blood or after profuse debilitating fluxes, any mental depressing emotion is able to produce it. Young persons are more exposed to it, but at that age the prognosis is more favorable, though they may succumb to pneumonia or phthisis, or it may terminate in irreparable dementia.

Secondary dementia is that decay of the faculties of the mind as a consequence of some pre-existing form of insanity which retains more or less sharply the characteristics of the disease from which it has been derived. This marasmus of the mind is often accompanied by marasmus of the body.

Senile dementia is the marasmus of the mind and body of aged people.

Dementia paralytica, general paralysis of the insane, is well described by Sheppard as a drama in three acts. In its prodromal stage we find fulgurating pains, which are too often taken for rheumatism, an alteration in the habits of the person, sometimes depression of mind combined with restlessness and hurry. Untidiness of mind and body, showing itself by absence from home, unmindfulness of family ties, indifference to order and punctuality, unequal dilatation of the pupils, slight thickness of speech, and a want of harmonious facial expression. Second act: Fastness, loudness, and restlessness prevail; exquisite mania de grandeur, but the delusions are fleeting, because memory is going fast; they always feel first rate, though they are wrecked paralytics. In the third, and last, act the grand delusions still prevail in rather a dimmed form, epileptic fits aggravate the paralysis, and the patient sinks down to the lowest ebb of vitality, till finally death comes to his relief. The average duration of this disease is about three years; it is a disease which attacks men in the prime of life, at a period when worry, hurry, and constant abuse of brain force may mentally and bodily ruin the strongest constitution.

Constitutional Insanities.

Epileptic Insanity.—1. Epilepsy may produce in the patient a general and lasting mental degeneration, showing itself especially by something akin to moral insanity, with more or less disturbance of the intellectual faculties; the afflicted become brutal, cruel, immoral, and their irritability of temper may lead to relentless and overpowering acts. Hemiplegia. 2. Mental and sensorial disturbances, before and after the epileptic fit, generally of a transitory character. Those preceding the fit may be considered as an aura, and may repeat themselves typically before the fit, as hallucinations of sight and hearing, or other subjective sensations. 3. Epilepsy larvata, furor epilepticus, showing itself by suddenness of the attack, without notice for its perpetration, without apparent initial stage, and reaching rapidly its acme; total unconsciousness; exquisitely frightful hallucinations and delusions; great mental depression after the fit; perfect amnesia, or the whole period of attacks appears like a dream; the typical characters, from first to last, of such attacks are the same; the actions correspond to the mental bluntness, blind fury and destructive energy, great brutality without plan or provocation. The anamnesis is here of the greatest importance.

Puerperal Insanity.—Pregnancy alone already changes the mental character of the woman; there are longings and morbid fears, an emotional melancholia with wakefulness, headache, and vertigo. During labor itself there is always great emotional excitement, and if this does not abate, puerperal insanity may develop during delivery, a few hours after the birth of the child, or it may come on at a later period, one or even two months after delivery. Great mental excitement, with aversion and homicidal impulse to her own child; excessive incoherence and a tendency to use obscene language; in the melancholic form there may be a strong disposition to suicide. Mental derangement during and after lactation is a symptom of exhaustion and of anæmia.

Insanity from poisons, as alcohol, narcotics, from malaria, from syphilis, are also mentioned, but they can be referred to one of the chapters already treated.

Treatment.—In the *treatment of mental diseases* we must never forget that we have to deal with a nervous system deeply affected in its nutrition. We must nourish, but not overfeed, our patient, and we must keep off everything which might be injurious to him, especially constantly recurring irritations, so weakening to an already weakened constitution. It is just as foolish to console a melancholic patient and to carry him into places of amusement, as to use restraint in cases of active melancholia. People are afraid of maniacs, and they are, therefore, more frequently and earlier sent to asylums than the former class. In fact, the quiet, the regularity and order, the kindness combined with firmness, make the asylum, be it a private or a public institution, the most fit place for those whose cerebral organs are mentally affected. No prison-asylum! but large farms with plenty of fresh air and work in the open air. There sleep will return to the weary, and the first step to recovery is gained. Give non-restraint a chance; wherever it has been faithfully tried, it came out victorious; where it failed, it was far more the fault of the officers and nurses than of the afflicted patients.

Totality of Symptoms.—When we consider that so many cases of insanity are of reflex origin, and that Hahnemann already taught the great value of mental symptoms, we are easily convinced that mere routine treatment must lead to failures. The successful alienist must be a general practitioner. "Tolle causam," if possible; remove that strength-consuming sleeplessness in the start, and you may save your patient from dreadful consequences. How rich is our materia medica in emotional remedies, and hardly a symptom can be found in a lunatic, which will not find its counterpart in some remedy. A truly homœopathic prescription is not easily made, but it pays well to search for it long and patiently, and in no place more so than in the treatment of the mentally afflicted.

Not labor, but worry, is the curse of our age; hence the personal symptoms are always neglected, and the drama of insanity is usually in full action before the physician is consulted. Let us never neglect that peculiar sleeplessness which is so often the accompaniment of neurasthenia—only another name for "life's forces below par." If we are able to procure *rest* and change from the habitual humdrum of life our remedies may have the proper chance to restore the disturbed equilibrium. Insanity is only a waking dream, and thus the same remedies found useful in the different dreams may give us a hint to the similar mental state when awake. It would lead too far to go through our Materia Medica, but as examples we may mention: *Aconite*, sleeplessness and restlessness from erethistic hyperæmia; *Arsenic*, for anæmic irritability from malnutrition, with nervous exhaustion; *Baptisia*, persistent wakefulness, leading finally to melancholia attonita—there is no sleep in him; *Coffea*, sleeplessness without a clear cause, all the senses appear more acute, the mind is so full of ideas that sleep seems impossible, a state of mind which, when not checked, may lead to mania; *Gelsemium* has likewise this wide-awake feeling, and, when falling asleep, nightmares harrow the patient with her tendency to melancholia; in the blood-destroying *Crotalus* the patient is afraid to sleep, for as soon as he dozes off he dreams of dead persons; several times we witnessed good effects for the insomnia after puerperium from *Kali brom.*, an anæmic state often leading to puerperal mania; the *Opium* sleeplessness is characterized by a multitude of hallucinations; when awake, the poor fellow is very sleepy, but cannot go to sleep; *Scutellaria* may be compared with Coffea, as the patient remains wakeful owing to the many pleasant thoughts crowding upon him; in *Valerian* we have hallucinations of vision, whereas Opium has more hallucinations of hearing. Thus even in the prodromal stage of insanity we must strictly differentiate the sleeplessness, and the same care is necessary in the accompanying restlessness, where the patient is dissatisfied and unhappy, for he feels that, though not yet insane, he is already *beside himself* (verrückt, out of his groove). In connection with this latter symptom we might compare *Aconite*, Ambra, Anacardium, Arsenicum, Belladonna, Borax, Bryonia, Calcarea with its diverse adjectiva, Causticum, Chamomilla, China, Chininum, Crocus, Ferrum, Hyoscyamus, Ignatia, Iodum, Mercurius, Nux mos., Nux vom., Opium, Platina, Pulsatilla, Rhus., Sepia, Silicea, Sulphur, Valeriana.

If we were to divide insanity into its different phases we would take for our guides melancholia, mania, and acute and chronic dementia. Now, melancholia may be subdivided into active and passive melancholia, but we will be most successful as practitioners and healers if we are able to remove the cause which upset the individual mind, and in that direction some hints may not be amiss. Thus we have among others:

For anxiety as if he had committed a crime: Alumina, Arsenicum, Chelidonium, Cyclamen, Digitalis, Ignatia, Mercurius, Sepia, Sulphur, Veratrum, etc.

Anxiety as if persecuted: China, Lachesis, Sulphur.

Religious melancholia: Arsenicum, Aurum, Crocus, Lycopodium, Pulsatilla, Silicea, Stramonium, Sulphur, Veratrum alb., Zincum; he prays constantly: Aurum, Agaricus (prophecies), Mancinella, Pulsatilla, Selenium; *with anguish and despair:* Aconite, Ambra, Abrotanum (loss of all human feelings), Calcarea, Ignatia, Lachesis, Lycopodium, Pulsatilla, Valeriana, Sarsaparilla, Veratrum.

Suicidal melancholia: Alumina, Arsenicum, Aurum, Belladonna (drowning), Hepar s., Naja tripudians, Capsicum, Carbo veg., Mercurius, Nux vom., Pulsatilla; wants death: Argentum met., Aurum, Mercurius, Pulsatilla, Rhus, Sepia; predicts death: Aconite, Arsenicum, Nux vom., Podophyllum, Rhus; *Resigned to death*, does not fear it: Agnus castus.

Homicidal tendency: All remedies indicated for active melancholia, even though an apparently passive patient may be roused into fury and commit a criminal action. We might mention: Abrotanum, Anacardium, Aurum, Hepar, Nux vom., Platina, Stramonium, Sulphur; or, Arsenicum, Cuprum, Lachesis, Tarentula hispan.; Fluoric acid and Sepia give us especially "hate against one's own family and friends."

For all our vices we may find suitable remedies. Really, he who seeks will find. Thus for *insane jealousy*: Apis, Hyoscyamus, Lachesis; for *amorous craziness in speech and acts:* Antimonium, Aurum, Hyoscyamus, Ignatia, Phosphoric acid, Veratrum alb.; for *insanity from and with masturbation:* Agnus castus, Damiana, Cantharides, Mercurius biniod., Nux vom., Phosphoric acid, Picric acid, Selenium, Staphisagria; for *avarice:* Calcarea fluorica, Lycopodium; for *pride:* Lachesis, Lycopodium, Platina, Staphisagria, Veratrum; for *insanity from egotism:* Calcarea, Lycopodium, Mercurius, Silicea, Sulphur. Hints might fill a volume, and still not exhaust the possibilities.

Even melancholia cum stupore, often only a superlative degree of passive melancholia, finds similia in our Materia Medica; thus, Gelsemium in the beginning, especially from worry and protracted labors. Baptisia, with its besotted look and tendency to profuse physical degeneration; also Apis, Belladonna, Digitalis, Cimicifuga, Croton tig., China, Oleander, Opium, Veratrum alb., and many more.

Mental exaltation and cheerfulness, with its outward demonstrations and talkativeness, finds indications in: Belladonna, Cicuta, Cimicifuga, Hyoscyamus, Lachesis, Lachnanthes, Paris quadrif., Stramonium; we meet cheerfulness in Crocus, Lachesis, Oxalic acid, Sabina.

A dread of being alone and a desire for company calls for: Arsenicum, Bismuth., Kali carb., Lachesis, Lycopodium, Stramonium, Baryta, Cannabis indica, Hyoscyamus, Lilium, Paris grand., Platina, Sabadilla, Verbascum.

All the forms of monomania consist in *fixed* delusions and hallucinations, and are characteristic of acute dementia, though delusions are too often a symptom of melancholia. Our Materia Medica is rich in remedies for this waking dreamland, and it would lead us too far to go into particulars.

Can paralysis of the insane, that dementia paralytica, be cured? We answer that question in the affirmative, if the premonitory symptoms are taken care of, and in the negative when the patient is not placed under proper care until after sclerosis has taken place. Keep a strict lookout for the pupillary symptoms and the unsteadiness in the motion of the eyes, in speech and in gait, and we will soon meet also those visionary delusions which are the patient's delight. Here we may do something by removing the patient to a quiet country home, far from the humdrum of city life, where his mind can be calmed again. I know no new remedy for such a state, and can only repeat that the success of the treatment depends upon individualization and zeal in the selection of the remedy.

HYSTERIA.

BY H. B. FELLOWS, M.D.

Synonyms.—French, Hystérie; German, Hysterie.

Definition.—A neurosis tending to chronicity, usually accompanied by acute paroxysms, in which the balance of health between the emotional, motor, sensory, and vaso-motor conditions is disturbed.

Ætiology.—It is impossible to separate the predisposing and the exciting causes of hysteria by sharp lines. A cause that is predisposing in some cases, may, in others, act as an exciting cause. A cause of sufficient intensity to excite the disease in a person already predisposed to hysteria, may not be sufficient to excite it in constitutions less inclined to it, but by a more or less constant repetition may so affect the nervous system as to make itself, or other causes, in time act as exciting causes. Predisposing and exciting causes then being of so similar a nature, no practical point will be lost by this seeming lack of systematic statement.

Among influences which take a prominent place in the causation of hysteria the hereditary influence must be considered. This may be direct or indirect. Brequet estimated that one-half of the daughters of hysterical mothers become themselves hysterical. The inheritance, however, need not be direct; for where the parents are affected with other neuroses the offspring may become hysterical.

Sex is also a predisposing cause of the first importance. While women are affected very much more frequently, still a similar condition is found among men. Brequet states that one man is affected with it to about every twenty women. Hammond, however, makes this ratio much less, estimating it at somewhat less than one per cent.

In what proportion of women hysteria appears cannot with certainty be established. Brequet says one out of every four females has it in a decided form, and one-half at least present undue impressionability that differs very little from hysteria.

How far the female genital organs act in producing hysteria is a question not yet settled. Buzzard says the disorder is only exceptionally found in women suffering from diseases of the genital organs, and its relation to uterine and ovarian disturbance is probably neither more nor less than that which obtains in other neuroses. Jolly says, special disorders of the female genital organs have a marked influence in the causation of the disease. The congenital difference between the male and female constitution is shown by the affection being more frequent among girls than boys. As hysteria prevails to a much greater extent during the period while the sexual functions of women are active, we cannot escape the conclusion that some direct influence towards this disease must arise either from the normal or abnormal condition of the sexual organs, but its occurrence in males, and in females both before menstruation is established and after it ceases, is proof that it is not simply of uterine or ovarian causation.

While hysteria occurs in both children and old people, it develops much more frequently in the first half of menstrual life. In Brequet's cases, one-half showed the first symptoms between twelve and twenty years of age, and one-third between fifteen and twenty years. The establishment of menstruation appears in some indirect way to favor the development of hysteria. The climacteric, which favors the beginning of the neuroses allied to hysteria, does not seem to especially predispose to the appearance of hysteria. Perhaps this is owing to the fact that those constitutions which are to become hysterical will have already fallen victims to this disorder from the various shocks which they must have encountered in earlier life; that, having passed so far without this development, they are assured against it except under circumstances peculiarly trying to the nervous centres.

Abnormal irritability of the nervous system, as shown by over-sensitiveness, a tendency to excited behavior, by rapidly changing moods, by a ready implication of the nervous system in other disorders, indicate a nervous temperament which may go on to the full development of hysteria. These conditions may be congenital or acquired. That which causes a deterioration of the general health and a consequent weakening of the nervous system, such as primary anæmia, hæmorrhages, or secondary anæmia, tends to its development. Diseases of the female genitals have an important influence in this connection. They may act by lowering the nutrition of the general system, or more specifically by their direct effect upon the nervous system. In many cases there is decided exacerbation of the symptoms during menstruation, gestation, and lying-in, but disorders of menstruation are certainly of frequent occurrence in hysteria, either as cause, or effect, or accidental complication. It is not always possible in every case to decide in what category they shall be placed. Hysteria does not seem to be associated with destructive diseases of the genital organs, as in cancer of the uterus, in as large a per cent. as in those diseases which are more simply irritative, as flexions or displacements of the uterus, or chronic inflammatory conditions of the genital organs. Marked as is the influence of genital disease in the development of hysteria, it must be borne in mind that the affection may appear quite independent of this influence; this is proved by the occurrence of hysteria in men and in women at ages when this influence can have no effect.

A weakly constitution, whether inherited or acquired, must be considered as a predisposing cause. Children born of phthisical parents, or of parents of advanced age, must be included in this category. Robust and full-blooded persons are, however, subject to hysteria as well as those of weakly constitutions and who are poorly nourished. No physical peculiarities can be given which positively indicate the hysterical diathesis.

That sexual continence may act as a causative factor seems to have been held by the ancients, and modern writers generally acknowledge the influence. The disease appears to be more frequent among single than among married women, and within my own experience I have seen hysteria at least very much modified after marriage. But it is to be remembered that the influences depending upon marriage are not summed up in that of the sexual relation. Very many other, and perhaps more potent, influences are changed. Still, in some cases I have seen the hysteria very much modified, if not cured, after marriage, where I could perceive but little change in other directions. The fact that hysteria is more common in single than in married women, does not prove in the majority of cases that the marriage has so marked a curative effect. It may prove that the hysteric girl is not as eligible in the matrimonial market as the one not so afflicted, and hence that those with the most pronounced hysteria do not marry. Many psychical influences are changed by marriage, and not the least are those which take the patient away from her former self by giving her new and necessarily broader interests.

Sexual irritation, especially from self-abuse, may have even a more pernicious influence than sexual abstinence. Some of the most vicious cases that I have ever treated have exhibited this condition. How far venereal excess may be considered as an exciting cause is yet an open question. Duchatalet says that hysteria does not exist with especial frequency in women of the town and those exposed to this form of excess. Buzzard affirms that prostitutes affected with venereal disease are very prone to hysteria.

Important as are the above physical conditions in any estimate of the cause of this disease, psychical influences hold even a more important place. Among the well-to-do classes the want of employment, the consequent aimless existence, the luxurious mode of living which gives undue prominence to the emotions, springing from the unhealthy excitement of balls, theatres, and emotional literature, and the reinforcement of these conditions by insufficient exercise, constipation, indigestion, and the consequent lowered tone of the nervous system, constitute a rich soil for the development of hysteria.

Again, among laboring women psychical influences of quite a different character, as constant over-work, attended by great anxiety, are often quite as harmfully effective. In all classes, if the emotions are unduly excited, especially if by depressing causes, as fear, anxiety, or grief, and with that degree of continuity often required in the nursing of sick relatives, hysteria may result. Mental shocks, as from suddenly hearing of a friend's death, may excite an attack. Whatever has a considerable element of emotion in it, particularly of a depressing nature, may so surprise the patient as to leave her with insufficient will-power for self-control, likely to result in a hysterical paroxysm.

Imitation often has a powerful effect in determining an attack. It is well known that a hysteric paroxysm occurring in a hospital ward or in a girls' school, is liable to spread as if by contagion. The same effect has been traced in some of the epidemics of hysteria which have attacked religious institutions in Europe, and even in epidemics in cities. Imitation may even become a predisposing factor. Thus the hysteric mother not only gives her daughter the hereditary constitution, but by the presence of the latter in the home, and by the tendency of the child to imitate the mother's example, contributes to the development of this diathesis in the child.

Symptoms.—Hysteria is so kaleidoscopic in its character that a definite description of its symptoms becomes almost impossible. There is no function or organ of the body but may show its influence, and the most opposite diseases may be simulated by it. It has two phases which are found with more or less frequency in all cases: the paroxysmal and the inter-paroxysmal state. This latter varies from what Huchard terms the hysterical character, and Roberton the hysteric constitution, to a condition in which some of the various and pronounced morbid symptoms become so established as to extend over long periods of time. The hysterical character appears, perhaps, most plainly in the mental make-up of the subject, and may appear to the careful physician before the onset of the developed disease. It will often in this way furnish a clew by which to unravel the tangle of many later and obscure conditions of the patient. The occurrence of the symptoms in such different groupings in different cases makes it necessary to study them in detail, and a further division into the following groups will facilitate an understanding of them: mental, motor, sensorial, visceral, circulatory.

Mental.—In this group will be included the symptoms which point out the hysterical character; for they are all present in the well-pronounced disease, only in a more exaggerated form. Even in the hysteric fit they are important elements, and often furnish the key to the situation.

There is great mobility of moods in the hysterical woman. She changes from grave to gay, or *vice versa*, with remarkable rapidity and with little reason. The mood of one hour cannot predict that of the next. Even minutes may show a total change in her feelings and conduct; tears may flow freely within a moment after a hearty laugh, and all the changes be brought about without any cause that would act on a well-balanced mind. Such persons have little control over the first movements of passion, and are, therefore, slaves to their emotions. They will express the greatest love and admiration for persons one day, only to hate them as vigorously the next. Their nearest friends, and those whose care should give them a deep place in their affections, are as likely to be the subjects of their dislike as anyone else, and this dislike may be aroused by some trivial circumstance wrongly interpreted and much exaggerated. Their emotional nature, feeding on this undue excitement, and growing by what it feeds on, shapes and colors their whole life. The balance in the emotional action is lost. The most insignificant affairs will arouse storms of emotional excitement, and that too of the very opposite nature from what would naturally be expected. Pathos may bring only laughter, while mirth-provoking incidents will be greeted with floods of tears. Time and energy may be spent in doing nothing, or in nursing a poodle-dog, while their gravest interests in life, even when endangered, will receive no attention.

Another mental peculiarity which is almost always a marked characteristic in the hysterical woman, is an unreasonable craving for sympathy. She likes her friends, and all who come about her, to observe what a great sufferer she is, and to extend to her their sympathy and condolence. She is not like other persons, and her sufferings are so peculiar that she cannot be judged by any ordinary standard; at least so she will have you think. Her desire for sympathy makes her exaggerate all her troubles. Superlative adjectives only can express her distress. Exaggeration is written over all her actions and words, so far as they relate to her own case. Not only does this exaggerated desire to gain sympathy take place in regard to whatever suffering she may have, but in order to indefinitely hold that sympathy she will not acknowledge herself well after all symptoms of actual sickness have disappeared. She still imagines herself sick, and is very much hurt if told that she is able to go about the ordinary duties of life. This same morbid desire for sympathy will fix her attention on any slight, uneasy sensation she may experience, and will make her talk about it until, by the aid of an active imagination, she has convinced herself and friends that she is an interesting invalid with some very unusual form of disease. Sometimes this desire becomes so prominent a characteristic that it leads to wilful deceit. It always partakes somewhat of this nature, but it is impossible to tell in just how far the woman herself is deceived, and in how far she exercises wilful deceit.

A young woman possessed of the idea that she is unable to leave her bed or chair and to walk across the room, for the time being may be as little able to do so as if her limbs were rendered powerless by some organic paralysis, and in this she may be as completely deceived as are those about her. As long as this idea remains dominant in her mind the inability will continue, and this notwithstanding the fact that some mental or moral shock will restore to her the use of the paralyzed limbs. The cases are, however, only too frequent in which, while professing inability to move across the room, she will regain the power under the stimulus of some more than usually strong desire. If the door of the room is left ajar in such a way as to expose her to observation when she desires not to be observed, she will be able to walk to it and close it. Yet her friends, on reëntering the room, will find her again seated in her chair or lying on her bed with just as stout asseverations that she is unable to leave it. Nor is it in such trifles alone that the moral nature shows its unstable condition. "The strangest vagaries of human nature," says Wilkes, in his chapter on Hysteria, "we perhaps ever witness are those which occur in young females in the early stages of womanhood; the whole nervous system, including the mental and moral nature, becomes so perverted that no circumstance of the most extraordinary kind may not then happen. The girl may not only present in her physical nature all the strangest maladies that can be conceived, but there may occur such aberrations of the mental and moral feelings that every one except the medical attendant would attribute her acts to wickedness rather than madness. Under such circumstances the behavior is like 'one possessed of a devil,' for the acts are not those of an ordinary criminal who has an object in his wicked deeds, but are often purposeless, or for the simple love of mischief. Thus I have heard medical men generally unravel those marvellous ghost stories which we are constantly reading in our newspapers by the discovery of a young girl in connection with them. When you see a paragraph headed 'Extraordinary Occurrence,' and you read how every night loud rapping is heard in some part of the house, or how the rooms are being constantly set on fire, or how all the sheets in the house are devoured by rats, you may be quite sure that there is a young girl on the premises."

Hysterical women are notably lacking in volition. Impulsive action, even in most excessive degrees, is one of their leading characteristics; but a state, either active or passive, deliberately chosen with the approval of reason and conscience, which is the result of will or volition, is quite an opposite condition. In the adult of average will the power to produce acts is represented in three degrees: the lowest are the automatic acts, simple or composite reflex acts and habits; the next higher, those which have their origin in the feelings, emotions, and passions; and the third and highest, those which are dictated by reason. Without the two former the latter could not exist, while it coördinates and unifies them. The mental activity involved in the highest degree embraces all those abstract concepts which are the foundation of the moral nature and which give tone and consistency to it. When this highest degree is lacking in development, or when it has become atrophied, the lower degrees of activity, emotional, automatic, etc., become the ruling power of the character. Emotions and passions furnish rapid and intense impulsion to act, and when the highest power, which makes choice of action possible, is absent or much weakened, and the person is left under the control of these impulses, the result must be a capricious and unstable character. Differing and often directly opposite emotions being constantly excited, the resulting acts from these impulsions must be of infinite variety; and this is what we find in the hysterical condition. Hence we see that this lack of will is one of the great underlying factors of hysteria, though it may vary greatly in different cases and at different times. It may be so completely lacking that the person will be turned by every trifling emotion, as is the weather-vane by every gust of wind. Here the motives of choice, which it is the province of reason to furnish, remain, as it were, only theoretical concepts, powerless to inhibit or control emotional, automatic, and reflex impulsion.

The consciousness is often disturbed or more or less in abeyance, perhaps completely so, in the gravest attacks of hysteria. But in very many instances where the woman is in an apparently unconscious state, the careful observer will appreciate the fact that she is quietly taking in all that is going on or that is being said about her. The wary practitioner will note this fact, and do and say nothing in the presence of such a patient that he does not want her to know. At times he may avail himself of this opportunity to make statements in her presence with the intention that they shall re-act on her mentally.

During these quasi-unconscious states hallucinations may occur. At these times the woman will express in words and by gestures a dreamy state, plainly depicting that before her mental vision appear various objects. These hallucinations may partake of almost every character, from horrible things, snakes, toads, crawling vermin, to human beings and angels, and even sometimes a state of ecstasy seems to supervene. We find many instances of this scattered through the Middle Ages in religious history, but we need not go back of the present for illustrations. The instance of Louisa Lateau by no means stands alone. The hallucinations may affect not only sight, but hearing, smell, taste, or general sensation. Like the vagaries that appear in other symptoms, they may affect the sight of one eye only, and that an amblyopic eye. They may vary, during the hysterical fit, in their character with almost every different minute, so that the sufferer passes from apparently the highest ecstasy to the deepest gloom. Allied to this condition is a state of maniacal excitement which may precede or follow the fit, or occur instead of it. These attacks may be attended with great restlessness, perversion of conduct, which is pretty coherent and wilful; loud and rapid conversation, sometimes blasphemous or obscene; laughing and singing or rhyming. These cases may glide over into real insanity, though this is by no means a necessary outcome of them. In most of these cases of a hysterical character the patient, after the storm is past, professes to know nothing of what has taken place; while in real mania they are able, after recovering from the excitement, to tell something of the incidents that have happened in their presence and of their own feelings. This will often be found an important diagnostic point between the hysterical, maniacal excitement, and the excitement of acute mania. In other instances the previous hysterical character of the patient, as well developed hysterical paraplegia, may alternate with the maniacal excitement. Still it must be remembered that hysterical patients do become insane. The ordinary mental symptoms may become more and more exaggerated, a more intense selfishness be developed, the character become more wilful, perverse, and deceitful, social obligations less and less observed until their hold is finally destroyed and the sufferer becomes a mental and moral wreck, irresponsible, degraded, and a fit inmate only for the asylum walls. The mental excitement not unfrequently takes an erotic turn; and such women may bring charges of indecent proposals or ravishment against the character of persons who are above suspicion, and they will even forge letters and concoct cunning schemes to prove such assertions. The intelligence need be by no means deficient; indeed, the intellect will in many cases be found very bright. This is especially true in some directions. The woman will show a wonderful faculty of divining the thoughts of others, and especially when they have any reference to herself. But with all this brightness she will generally be found deficient in the highest qualities of judgment and volition. Her reason does not act with a reliable force just at the critical time.

Sensory.—Pain, hyperæsthesia, anæsthesia, analgesia, all occur in hysteria. The pains of this disease may be of any and all varieties. In fact, the patient may describe any number of different pains as affecting any part of the body. Thus in her chest she may have gnawing, burning, boring, pinching pains. But one characteristic is very apt to mark them all. When her attention is called to them, they become extreme, and only such adjectives as "awful," "intolerable," "excruciating," will describe them. When pain occurs in connection with any local disease of the parts, it will be marked by an exaggerated degree usually much in excess of that usually found in a different class of patients. The exacerbation of the hysterical pain will bear a relationship in time to the inquiries and expressed sympathy of friends. On the other hand, when the attention is distracted from the pain, there will often be a sudden cessation. A pain in the lower part of the chest, more usually on the left side, is most frequently met. This is usually more diffuse than true intercostal neuralgia, and does not limit itself so definitely to the course of certain nerves, while the tenderest pressure partakes of the same character and is not found so accurately confined to the *points douloureux* of Valleix. Sometimes these pains involve the breasts, simulating those of scirrhus. Headache is another symptom of very common occurrence with the hysterical. It usually takes the form of hemicrania, and is not unfrequently associated with menstruation. A pain of a severe nature, and occupying a very limited space, usually not very remote from the sagittal suture, is so characteristic that it has received the name clavicus hystericus. At times, pain in the head so obstinate and so long continued as to remind one of intracranial tumors, occurs. These headaches are very apt to follow from any emotional disturbance, particularly if that be of an unpleasant nature, and are often attended by great superficial sensitiveness and hyperæsthesia of the senses. Even when the headache has ceased, the tenderness of the scalp will be so great that even brushing the hair will be painful. Pain in the back is a symptom frequently met with. It may be located in the occiput, or in the dorsal, lumbar, or sacral regions. In some cases it affects the coccyx. Hyperæsthesia over the spinous processes, especially in the cervical and dorsal regions, accompanies this pain. The tenderness to pressure may be either superficial or deep. In many cases, at least, the pain must be situated in the skin, but in others it is probably deeper, for the patient only learns of it when deep pressure is employed in the examination. This tenderness and pain is like that of spinal irritation, and it has been questioned if spinal irritation is more than a special form of hysteria. It is certain that in many cases other hysterical symptoms accompany this one. Pains and tenderness are common in the abdomen, and the latter condition may be accompanied with tympanitis, thus resembling peritonitis. Such a state has sometimes been called hysterical peritonitis, but there seems so little evidence of the presence of inflammation that the term must be considered a misnomer; when the attempt is made to examine the abdomen, the hysterical patient exaggerates the degree of tenderness, at least so long as her attention is allowed to be fixed upon the matter. The seat of this pain and tenderness may probably be in any or all of the tissues from the cutaneous to the peritoneum, or even to the bowels themselves. Epigastric tenderness, by no means a rare symptom, will more usually be found in the attachments of the recti muscles than in the stomach itself. Hypersensitiveness in the ovarian regions, more often in the left, is an obstinate symptom in very many cases. Charcot and others have made careful studies of the irritable ovarian regions, and demonstrated that the ovarian fit can in many cases both be brought on and modified by pressure in this region. Some authorities, notably Jolly, insist that the development of the hysterical attack by pressure upon the hyperæsthetic ovary is not the only instance of a similar nature, but that pressure upon other sensitive parts may also develop an attack. Among the mimetic features of hysteria the joints do not escape. The hip and knee joints are the favorite locations, though the ankle, elbow and wrist, and even the finger-joints, are not left free. After some slight injury, or without any, the joint becomes tender and painful, but usually lacks the redness, swelling, and heat that indicate the acute forms of joint-disease. But sometimes the mimicry is so close that it requires all the skill of a shrewd surgeon to distinguish the false from the real joint-disease. It will be noted in most of these cases that the tenderness is rather superficial than deep, and that light handling or pinching the tissues to the joint will cause more signs of distress than bringing the bones together forcibly.

A pseudo angina pectoris may be developed. This may take the place of the convulsive attack, and be followed by hemiplegia with hemi-anæsthesia. Palpitations of the heart are of much more frequent occurrence, depending, in many cases at least, purely upon sensory disturbance, for neither auscultation nor palpation, nor the condition of the pulse, will show any motor disturbance of the heart. The explanation is probably found in the hyperæsthesia of the nerves in the cardiac region, making the normal impulse of the heart against the chest-walls sensible to the sufferer, but motor disturbances of the heart do sometimes take place.

A sensation of a ball in the throat, or of one rising from the stomach to the throat, and of choking, is one of the most common disturbances found in hysteria. Whether this is in all cases to be classed among the motor symptoms, as is done by some authors, and explained by spasmodic action of certain tissues, may be questioned. That spasmodic action of the muscles of the throat does, in some cases, accompany the sensation of choking, cannot be doubted, but in others the symptom seems to be more sensory in its nature.

A general hyperæsthesia of the entire surface rarely develops, but more frequently it is present in limited areas, though these oft change their locality, and may be mixed up with anæsthetic spo The special senses are also liable to hyperæsthesia. In some instan a true hyperæsthesia of sight may take place, but more commo will be found the hypersensitiveness to light. The reverse of th conditions, as shown by amblyopia, achromatopsia, hemiopia, or ev complete blindness, may appear. When hypersensitiveness to col exists, it is more frequently to red. In these cases an ophthalmosco examination of the eye reveals no organic change.

The sense of hearing may also suffer from a true hyperæsthesia, the patient be able to hear sounds with distinguishing clearness t will remain either unheard or indefinite to ordinary mortals. Sli noises, like the crumpling of paper, may be quite intolerable. S jective noises of various kinds are also among the complaints.

The *plus* and *minus* develops in the same way with the sense of sm and hysteric patients will occasionally be able to recognize their quaintances by the different odors which they perceive about them. times, however, there seems to be a loss of this sense, accompan with an anæsthesia of the nasal mucous membrane, so that even snuffing of pungent substances produces no sensation, nor even reflex act of sneezing. But true to its character for vagaries, the ease will, in some, develop a liking for various atrocious odors, asa fœtida may be esteemed more fragrant than the attar of roses.

Taste may also be similarly affected. Sapid substances, or e substances the most disgusting, will be eaten.

Anæsthesia is perhaps of equally frequent occurrence with hy æsthesia. It rarely involves the whole body, but much more commo attacks certain circumscribed spots. When it takes the form of h anæsthesia it is usually associated with iliac tenderness on the s side. Anæsthesia may be of the sense of touch, or of heat, or of painful sensations (analgesia), and more than one, or all, may b volved. It may affect both the superficial and deeper tissues and mucous membranes. The anæsthetic places do not bleed when pri even with a large pin, nor do they redden under irritation. Thus finger may be wiped across the anæsthenic conjunctiva without b followed by hyperæmia. The fauces, one of the favorite places fo development of anæsthesia, can be manipulated not only wit sense of discomfort, but without producing retching. Anæsthes the bladder may be the cause of retention of the urine. A para condition is, however, often combined with this state of affairs. A thesia, as well as hyperæsthesia, affects the mucous membrane of genital organs, the latter often leading to self-abuse and develo vaginismus, the former destroying all sexual enjoyment.

The anæsthesia must be discovered by the physician, as the pa is rarely aware of it. It is quite probable that in those cases of teria in which self-mutilation is practiced, anæsthesia is present, and that the mutilation causes more suffering to the friends than to the victim herself.

Motor Symptoms.—The motor symptoms in hysteria are as varied as the sensory. They in one phase show excessive mobility, and in another loss of power. They respond to less stimulus than is natural, and show the lack of being under control of the higher mental powers. They also show an excessive action in a quantitative way to the stimulus; thus, if they have their origin in idea, the action is brought about by a less degree, and may be more excessive. A stimulus which in the normal condition would pass with but slight, if any, notice, would cause prompt response in the hysterical subject, as when light, which would leave the eye unirritated in health, will cause shrinking and wrinkling of the brows in the hysteric. The motor actions which originate in the lower nervous centres, such as occur more strictly from reflex irritations or organic stimulus, especially show an excessive and persistent character. All parts of the muscular system may be involved in the hysteric fit. The whole of the spinal system especially may become affected, or it may be confined to certain parts of it. This may also involve more or less of the internal organs. Where there are general convulsions, generally the face will be found not to be involved; but in the more marked degree of convulsions the face may be affected. The face itself often carries a suggestion to the eye of the observer of the hysterical character of the invalid. A certain changeableness of its expression, without due emotional cause, owing to the peculiar action of its muscles, has been considered by some as characteristic of this state. It corresponds to the peculiar mental attributes already described. A spasmodic action taking place about the respiratory muscles, and especially of those about the throat, will cause dyspnœa. This may be so severe that, if originating from another cause, it would certainly be attended with great danger to life. The breathing in many cases, even when the patient does not notice any especial want of breath, may be very rapid or irregular. At times this partakes of the character of laughing or crying, perhaps with rapid alternations, and without any emotional excitement to account for it; but this symptom is apt to have its origin in some emotional disturbance, even though it be slight. A persistent, harassing cough, usually of a dry character, and which will show its hysterical origin by increasing under notice, may develop. Palpitation of the heart, as has already been noticed, may sometimes be of motor origin. The violent beating of the heart against the chest-walls can be plainly felt by the hand, and the patient will feel all the choking sensations and discomfort incident thereto. At times this may lead to syncope, and be attended with a weak, irrregular pulse. This condition may be quite prolonged, and partake of the character of a trance. While it is usually unattended by immediate danger, it has in some cases resulted fatally.

The spasms which take place about the various groups of muscles may be either of the clonic or tonic variety. When of the clonic variety, they occasionally have a rhythmical movement which simulates an underlying aneurism. The tonic variety, taking place in the limbs, are more frequent, and often very persistent, even continuing during sleep and during the inhalation of chloroform, unless pushed to the full extent of safety. These contractures may take place after hysterical fits, and especially when they develop hysterical hemiplegia. They sometimes develop gradually. When they attack the hand and arm they produce a general flexion, but when they attack the leg and foot, extreme extension is more apt to result, with the knee drawn inward by the adductors. The muscles of the part do not atrophy, except so far as disuse affects them, and under strong mental influence the contraction will sometimes suddenly resolve itself.

The development of hysterical paralysis follows in its distribution the same course of the anæsthesia and spasms. It varies in degree from slight paresis to complete paralysis. A paralysis of the vocal chords gives rise to aphonia, a common symptom of this class of patients. When it affects the system more generally, it may in some rare instances affect all the extremities, but more frequently will take the form of hemiplegia or paraplegia. Sometimes it will affect one arm and the opposite leg. When it takes the form of hemiplegia, it usually follows a convulsive attack, and the diagnosis of hemiplegia from organic diseases of the brain and the hysterical form may be attended with difficulty. In the hysterical variety the face remains free from paralysis, while it is usually affected by the organic disease; and the tongue, in the latter case, on being protruded, will deviate to the paralyzed side. Anæsthesia more frequently accompanies the hysterical form than the organic, and the leg is usually more affected in hysteria than the arm. In all forms of hysterical paralysis the electrical reactions of the muscles remain normal, or are only slightly diminished after a long duration of the paralysis. The reaction of degeneration never takes place.

Visceral.—The appetite is often perverted in hysteria. Sometimes there is complete anorexia, and so little food will be taken that the anæmia so generally present is constantly kept up or increased. At times the anorexia is so great that it is difficult to get sufficient food taken to prevent complete prostration. It must not be inferred, however, that no food is taken by the patient simply because she says she eats nothing. Fasting girls who go so long without food and still maintain a fair physical condition, upon close watching will not be found so abstemious as report makes them. Food is sometimes rejected soon after it is taken, and this vomiting may prove a very obstinate symptom. In many cases, however, considerable food must be retained in spite of the vomiting; for the condition of nourishment of the general system is not as low as the vomiting would lead one to expect to find it. This vomiting may be accompanied by pain, and resemble closely the gastric ulcer. At times it is impossible to make a definite diagnosis between the two, except by close and continued watching of the case. Where it is found in the history of a case that attacks of this kind have appeared before, and, after being present for some time, have been quite suddenly cured, and that relapses have taken place, accompanied with other hysterical conditions, it is safe to infer that the whole condition was of hysterical origin. Still it must be borne in mind that gastric ulcers may exist in hysterical subjects. Vomiting of blood does sometimes, though rarely, occur, of a purely hysterical character. These cases are quite likely to be the result of some trickery for the purpose of appearing interesting and to gain the sympathy of the astonished friends, and careful investigation may show that the vomited blood is simply that of some animal, first drank and then thrown up. This depraved appetite will lead hysteric patients to eat all sorts of disgusting things, even to the drinking of urine, that they may vomit them again.

In the belly there is often a hyper-secretion of gas, causing belching and borborygmi, leading also to tympanitis. In some cases spasmodic constriction of different portions of the bowel will confine this gas in particular pouches, which may be mistaken for abdominal tumors or enlargement of the spleen or liver. Sometimes there is anæsthesia of the bowels, probably often complicated with a paresis of the muscular coat, and thus causing obstinate constipation and allowing large accumulations of fæcal matter. Retention of the urine is not unfrequent. This may be owing either to anæsthesia of the bladder, to spasmodic action of the sphincter, or to paralysis of the detrusor. After retention has lasted a certain length of time there may be dribbling of the urine. Still more rarely, suppression of the urine takes place. More frequently, however, than either of these conditions, is found a hyperæsthesia of the bladder, causing an almost constant desire to void the urine. At times the patient will deny passing any water, though expressing a great desire to do so, but the passage of the catheter will show an empty viscus. There may be a morbid desire to have the catheter passed, as is shown by the asserted impossibility of passing the water without its aid, but upon the positive refusal to pass it again, with the assurance that it is no longer necessary, the woman will be able to empty her bladder as in health. Many hysterical attacks are followed by a very profuse flow of urine, which is clear like water, and of specific gravity but little above 1000.

Circulation.—The circulation may be affected not only in the manner already indicated, but in others yet to be described. Hysterical patients frequently complain of rush of blood to the head, with marked flushing of the face; and this, notwithstanding the general anæmia with which they so often suffer. Hyperæmia, as well as ischæmia, may occur both in the internal organs and on the surface. In the latter case it is shown by frequent blushing. Hyperæmia may be shown by derangement of function or even by hæmorrhage. In this way may be explained the various hæmorrhages that take place, although it is not impossible that the coats of the bloodvessels themselves in some way suffer from the nervous derangement. Metrorrhagia is one of the most frequent forms that hæmorrhage assumes in this condition, and bleeding from other organs is, perhaps, more liable to take place at the time of menstruation, in such cases assuming more or less of a vicarious character. But it must not always be inferred that uterine hæmorrhage in hysterical subjects is simply a part of the hysteria; for there may be organic disease of the uterus in conjunction with the hysteria, which may be a potent factor in causing the hysteria as well as the hæmorrhage. Amenorrhœa may, however, be present, which probably depends upon an ischæmic condition of the uterus, due to vaso-motor spasm as well as to the general anæmia. Well-authenticated instances are on record in which hæmorrhage occurred from the more external parts of the body, as the breasts, the eyes, the hands, etc. In rare cases bullæ may form, at first containing clear serum, which afterwards becomes bloody and leaves marks upon the places. This more usually occurs upon the hands, feet, and forehead, and has given rise to the term stigmatization, because certain superstitious persons have supposed them to be miraculously impressed upon the parts in imitation of the wounds on the crucified body of Christ. A condition of general anæmia is usually present in these cases, though it is not seldom that the invalid will show a good state of the general health.

Paroxysmal attacks in hysteria are by no means uniform, though a certain likeness in the various symptoms may run through all of them. While the very light and the very severe will perhaps seem to the superficial observer as totally different, yet, when studied in their gradations from one to the other extreme, the likeness will not fail.

The hysterical paroxysm is usually a combination of emotional and convulsive disturbance. In the lighter form it may consist of little more than an emotional storm, or, again, the convulsive feature may be by far the predominant symptom. They are usually brought about by some definite cause, though this may seem quite trivial in its nature. The patient may be talking somewhat excitedly, then suddenly burst into tears which may alternate with laughter, all alike unreasonable. In some instances she may simply indulge in what to others would seem ordinary gayety, when suddenly, losing control of herself, tears without cause may flow, or with a scream and a spluttering noise, as from choking, she may fall down, her breathing become difficult, and a quasi-tonic convulsion ensue, the face becoming disfigured with grimaces, and she continuing to utter outrageous noises and moans. During this time the contortions of the limbs may continue, more or less incoherent complaints be made, and the patient sink into a faint, exhausted condition, the whole fit ending in another flood of tears, followed by a free flow of urine, consisting of little more than urinary water. After this the patient may seem quite herself again. Prĕvious to the fit there may be complaints of distress in the stomach or head, and buzzing of the ears, sometimes of a ball rising from the stomach to the throat, or, according to Charcot and Grasset, from one of the ovarian regions. This choking is not, as has been supposed by some, the cause of the fit; for the fit has occurred after tracheotomy had been performed and before the tube was removed. When the patient falls, there is apt to be something of a stage effect, and she frequently will make her way to a lounge or bed before self-control is lost. In fact, there is little danger of her so falling as to do herself any damage, either by striking against anything that would bruise her seriously, or by falling into the fire. Even during the contortions which follow the same care is exercised. This is quite unlike the epileptic, who falls wherever he is taken and without any regard to consequences, and who not unfrequently is much injured. The convulsive movements appear almost as if merely exaggerated physiological movements, and not altogether purposeless. Thus the patient will grasp things with her hands and teeth, and hold on to them, or will assume histrionic attitudes. The same peculiarity marks the facial spasms of hysteria. Instead of being the horrible distortions seen in true epilepsy, they partake more of the appearance of those caused by deep emotional disturbance. The cries are also marked by certain peculiarities which especially distinguish them from the epileptic cry. In hysteria they are prolonged, sometimes during the whole attack, and resemble the cries of one suffering under an operation, or they are incoherent noises or ejaculations. In epilepsy there is but a solitary, ominous wail which never fails to strike the hearer with horror. In epilepsy the loss of consciousness is complete, while in hysteria it is usually partial only. It is possible in the graver attacks of hysteria, and especially in hystero-epilepsy, that there may be complete loss of consciousness, but this is not true of any of the lesser grades. The eyes in the hysteric fit may be partly closed and may roll upwards, but the patient is able to see, and she looks, generally taking in what is being done and said about her. These attacks vary in duration from a few minutes to some hours.

There are some graver forms of hysteria in which the convulsions more nearly resemble epilepsy. In these there may be the more sudden loss of consciousness, more pronounced tonic spasm, followed by clonic spasms, and often succeeded by coma. Sometimes veritable epilepsy appears in hysteric subjects, or hysteria may be added to epilepsy, but in a part of the cases at least the spasms are only epileptiform, and do not take all of the characters of true epilepsy. This will be seen more fully when we come to speak of the distinction between epilepsy and hysteria.

Hystero-Epilepsy.—In another of the graver forms, which has been carefully studied in Salpêtrière, and has been admirably described by Charcot and Richer, we have the typical hystero-epilepsy. As described, we find that the victim suddenly falls unconscious in severe tonic spasms, with deviation of the head, and the tonic spasms become clonic, followed by stertor and coma. This forms the epileptic part of the attack.—This is followed by a brief period of relaxation, when it merges into what the French call the *phase des grands mouvements.* Here the contractions become more coördinated, and the patient may rest on head and heels in violent opisthotonos, or the trunk may be straight and the limbs extended, less commonly flexed, or the limbs may be distorted in various ways, sometimes in extreme flexion, more commonly in extreme extension. Sometimes bounding movements are produced by the alternating flexion and extension of the limbs; at other times there will be a very rapid rotation about the long axis of the body. This is succeeded by a stage in which the emotional excitement plays the prominent part, and is known as *des attitude passionelle.* The first attitude will be one of threatening, with clenched fists, corrugated brows, and rigidity of the trunk. This may be followed by one of abject fear, with its usual accompaniments of shrinking and trembling, and this in turn give place to the attitudes and gestures of voluptuousness, which is known as the phase of *lubricity.* These attitudes are sometimes followed by a delirium of terror with horrid hallucinations, in which she sees rats, mice, and other vile things. Then the idea will seize her that she has committed some great offence which she bemoans with the greatest intensity. This will give way, perhaps, to the hearing of music, and a happiness as extreme as was her terror will possess her, but her singing soon turns into weeping, and this is followed by recovery. These typical cases of hystero-epilepsy, if I may judge from my own experience and that of other physicians with whom I have consulted, do not occur frequently in this country, and, judging from the English writers, are also rare in England. Charcot dwells upon the fact that in these cases there is not only ovarian tenderness, but that an aura rises from the ovary to the epigastrium and throat at the beginning of the fit, and that moderate pressure in the ovarian region will, in many cases, determine a fit, while more positive pressure will either modify or put an end to it. The fit is occasionally preceded by some mental peculiarity, or there may be contraction of a limb which gradually increases until the epileptoid stage develops. At any period of the attack, even to the epileptoid stage, it may be arrested by ovarian compression. When the attacks are influenced by treatment, it is by such treatment as might be effective in hysteria rather than in epilepsy.

Pathological Anatomy and Pathogenesis.—No pathological changes have been discovered in hysterical cases with any such uniformity as would point to them as the cause of the symptoms. Charcot has described a sclerosis of the pyramidal columns, which was found after the case had existed for some ten years with paralysis and contractions, and it has been suggested that the hysterical symptoms might have been the result of the primary irritation which, by its long continuance, resulted in this organic change. Where there have been other organic changes they have more probably been due to other diseases, of which the hysteria was merely a complication. While it is possible that the hysterical symptoms may represent the initial irritation, which, if sufficiently long-continued in the nervous centres, may result in some organic change, a proposition of this kind still lacks proof. That the changes in the nervous centres, as in some cases of softening of the brain, produce hysterical symptoms is well known, but as in so many cases where hysterical symptoms have been well pronounced a post-mortem examination shows only negative results, even with the aid of the microscope, we cannot infer that those changes are an essential part of the disease. What the essential change really is, is one of the questions of the future. Changes found outside of the nervous system fail to account for the disease; for all these conditions which have been found, while they existed with hysteria, also exist in other cases, and *vice versa*. The one fact that persists in all forms of hysteria is the disturbed action of the nervous system. While diseased organs may react on the nervous centres, either by reflex influence or by altering the condition of the blood, yet all these conditions may exist without producing the hysterical developments. We must infer, therefore, that the essential alteration of hysteria is in the nervous centres. If it is studied in the forms of hemi-anæsthesia, or paralysis, or spasms, the parallelism to certain conditions of the brain is sufficiently marked to readily suggest that the centre of the diseased action is within the brain, similarly situated. The emotional disturbance so universal in this disease also points to the brain as its origin, and the psychical symptoms certainly cannot be traced to any other part.

That the hyperæsthesia is not a local condition of the peripheral nerves is shown by the fact that in cases in which limbs have been amputated because of it, the symptom has continued to exist. In these cases clearly the pain and distress have been projected from some nervous centre, in consonance with that law which makes the pain appear at the peripheral extremities of the irritated nerve. Some symptoms and conditions seem to point to the fact that the spinal marrow may be involved primarily, for sometimes, when any irritation produces a reflex action, it will first affect the muscles from the vicinity of the irritation, which will gradually spread so as to involve others from adjacent parts of the nervous centres, until their extent has been reached; and this corresponds to the manner in which the reflex actions are generated from the spinal cord. The readiness with which reflex actions take place in some cases would also look as if that part of the reflex arc situated within the cord were especially involved. What the special condition of these centres is, in what manner it varies from that of health, we can only estimate as it appears in symptoms. The harmony which comes from the normal action of the nerve centres which produces sensations of health, of orderly movement, and emotions duly balanced with circumstances, is disturbed. Some of these centres are unduly excited, and exercise a predominating control over the whole action, either by direct reflex or indirect reflex action, or because other centres which should regulate their action do not respond to the stimulus which should call forth their controlling influence. Thus the different parts of the nervous system no longer produce well coördinated and harmonious action, giving us as their response the vagaries of hysteria. This peculiar condition, which we must designate "irritability," for want of a better term, is, perhaps, like that found in epilepsy or insanity, or perhaps in some other nervous diseases, to a certain point, beyond which conditions develop which make these diseases quite separate and individual. The change must be considered one of degeneration, and yet it is not so marked as those which occur in either insanity or epilepsy.

Prognosis.—Hysteria itself is rarely fatal to life. It cannot be said, however, to be entirely without direct danger, for cases have died where the symptoms were hysterical, and where a post-mortem examination showed no organic disease to account for the death. In other instances it may be fatal in an indirect way, as from the results of the mutilation which the patients may inflict upon themselves. It also leads, in some instances, to melancholia or to other form of insanity by which the patient's health may be gradually worn away after having been for years a curse to herself, a burden to her friends, and a torment to her doctor. Many cases may be cured where the circumstances of life may be so controlled as to remove the special causes of irritation, or where the latent disposition to hysteria is aroused by some curable physical condition, where hope and congenial work for a desired object in life may be had, and where the depressing emotions, jealousy, fear, hatred, can be dispelled. But in those constitutions where hysteria is thoroughly ingrained, where antecedent influences, perhaps from birth, have been bad, or where the present influences are unfavorable and unalterable, it is not possible to predict a cure. Nature relieves many cases as the years multiply and as the imagination gives place to a more correct estimate of the sober facts of life, or brings relief at the change of life, when woman's special functions are over and she tends towards a masculine character of body and mind.

Diagnosis.—The diagnosis of hysteria with well-pronounced emotional motor and sensory symptoms can be readily made. But it is by no means easy to say exactly where the term shall first be applied in cases exhibiting functional nervous phenomena. Persons who are easily disturbed at trifles, who are somewhat moody, who are liable to lose their self-poise, may be said to tend towards hysteria. When we add to this some motor disturbance and sensory anomalies, we may justly term such a condition hysterical. Many cases will so clearly fall under the various conditions described in the symptomatology that there will be no difficulty in recognizing their nature. We have also indicated many of those mimetic conditions which hysteria assumes with sufficient particularity to enable them to be recognized. In general, where contradictory symptoms appear, and particularly where a previous history has shown either developed hysteria or a hysterical diathesis, it may be considered that hysteria is present. If the hysteria simulate epilepsy in addition to the positive characteristics of the convulsive form of hysteria already given, certain other negative conditions will enable us to recognize its nature. Thus, the tonic contractions of epilepsy are in a more disordered form and do not tend to opisthotonos, which may appear in hysteria, and when the tonic spasms pass into the clonic form they are more coördinated in hysteria, less so in epilepsy, and more shock-like. The loss of consciousness is complete in epilepsy even in its lighter forms, while it is seldom complete in hysteria, and never in any but its graver forms. The staring eye and dilated pupil in epilepsy are replaced by the partially closed lids and the rolled-up eye in hysteria, which will in many cases furtively take a look at what is going on around. Epilepsy often terminates in coma and sleep, and in recovery without secondary disorders of motion and sensation. The hysteric fit generally terminates with emotional disturbance and a characteristic excretion of urine, and is frequently followed by disorders of sensation and motion. The epileptic fit frequently occurs during sleep, the hysterical paroxysm never, but such times and places are selected as will insure its being observed. In hystero-epilepsy pressure upon the ovary will frequently modify or stop an attack; in epilepsy, never. Where there is a succession of epileptic fits (status epilepticus) a considerable elevation of temperature, according to Bourneville, takes place, as high as 105.8° F. Even though the hysterical convulsions continue for some time, the rise in temperature is very slight.

To distinguish hysterical convulsions from puerperal eclampsia, attention must be paid to the previous history of the case, to the fact of complete unconsciousness in eclampsia, and the presence of albuminuria. In hysterical hemiplegia the face or tongue is very seldom involved, while they are usually involved, at least in the earlier stages, in hemiplegia dependent upon organic disease of the brain. In the hysterical form the leg is usually more involved than the arm, and when the patient walks she drags the foot after her, and does not fail to produce extension of the toes during the forward motion of the foot, while in hemiplegia from cerebral hæmorrhage, the patient in stepping, circumabducts the foot, and the toes drop. Cerebral hæmorrhage is not apt to occur in young persons, while hysterical hemiplegia is seldom found in persons after middle life. There is also shown a general hysterical history. In hysterical paraplegia the onset has not the symptoms of myelitis, but will show other hysterical symptoms. The paralysis will not usually be complete; the patient will be able to move her legs in bed, and especially when asleep. There is no tendency to bed-sores, a common symptom in paraplegia, which originates from organic disease of the spine. In the hysterical form of this, as every other form, of hysterical paralysis, there is no tendency to atrophy of the paralyzed parts, and the electrical reactions are normal. From locomotor ataxia it is differentiated by the fact of the continued presence of the knee reflex. From some forms of spinal disease it can only be diagnosticated by a continued watching of its course, which usually shows more variations and is more influenced by emotional disturbance than the real disease. In a few cases it may be quite impossible until the termination of the case to be absolutely sure about the diagnosis. We have already given the main points which will influence the diagnosis in disease of the joints.

It is sometimes quite puzzling to decide between real diseases of the internal organs and the mimic forms of hysteria.

The diagnosis can generally be made by the negative qualities of the hysteric difficulties. They will lack the physical signs, and the histories will not run parallel with those of the real diseases. Where the mimicry is that of the acute inflammations, the pulse and temperature will be unlike that which accompanies inflammatory action. This has already been pointed out in regard to peritonitis. There will also be the general air of exaggeration running through the case, and a general hysteric history. The physical symptoms will often be of great importance both in diagnosticating the nature of the difficulty and in estimating the immediate danger. The examinations, however, of such patients should be very carefully made; for it should always be borne in mind that in the hysterical constitution an hysterical cast may be given to any form of disease, and valuable time in the treatment may be lost by supposing the disease to be only hysterical.

Treatment.—Where children are born of a hysteric parent, much might be done to prevent the development of the hysteric constitution if we could fully understand the circumstances of their lives. Individually, however, this can seldom be done with any completeness. They have not only their inherited nervous constitution, especially prone to the weakness of hysterical action, but their surroundings are usually such as tend to develop the inherited tendencies. The influence of the mother, with her vagaries of disposition, her brightness of one hour, her depression of the next, her excess of sympathy alternating with total indifference, her excessive emotional states, her lack of intelligent will-power which makes her pursue an uneven and fitful course of government, all tend to foster and develop in the child the same unstable character. This is reinforced perhaps by the influence of a nurse who is ignorant and superstitious, and regards her own ease as above the child's welfare, and who disciplines the child by inflaming its imagination with all sorts of horrid ghost-stories. What wonder that the child whose life is cast on such lines should develop sooner or later the confirmed hysteric condition? If this result is to be avoided, it must be by a mode of life the direct opposite of the life described. During the developing period of life there must be as few as possible of those emotional storms brought into the life of the child either directly or indirectly. The imagination and fancy must not be over-stimulated, but rather repressed, and only cultivated in healthy directions. The discipline must be that of reason and justice, and not of vagaries and temper. Great effort must be made to develop the powers of volition, and to repress that wilfulness which makes it give way to every whim which shoots athwart its sky. In the matter of education equal care should be taken, and a wise oversight should be exercised over the matter of its reading and studies. Such literature as appeals to the emotions exclusively, either religious or secular, should be avoided. Such punishment as shutting a child up in a dark room when it is afraid of the darkness, is especially to be deprecated. Forcing it to go up to, or to handle, an animal of which it is afraid is to be classed with the same deleterious influences which are potent to develop the latent hysteric constitution.

Important as is the mental and moral training of the child, the physical is of equal importance. The cardinal principle here must be to produce as robust a condition of health as possible. The diet must in this instance receive careful and intelligent consideration. Capriciousness of appetite is very likely to be a leading evil in this class of subjects, and it is therefore necessary that a wise choice of plain and nutritious food should be made, and such an appetite fostered. When the child arrives at the age of puberty with an appetite trained for delicacies, sweetmeats, and nicknacks, and with such other improper habits of body and mind as will accompany such a condition, she is in a fit condition for the change in the nervous system then taking place, and which brings out the hysterical element which until that time may have lain dormant. With the conditions which lead to a pampered appetite must be classed all those others which lead to oversensitiveness of the body and to the deterioration of its nourishment; to close confinement in-doors, exclusively warm bathing, too little active exercise in the open air, too much dress, too many parties, too late hours, and too late rising in the morning. All this ought to be altered, and the child put under such a regimen as will develop the robustness of its constitution, and enable its will to control those outbursts of emotion which so often lie at the foundation of hysteria.

After the disease is fully developed we have still to pursue the same general course in principle as the above. We must have first in view the psychical condition. Without prying into family affairs, the physician must be quick to see where points of mental and moral irritation have sprung up, and he must be careful and wise in his advice concerning these delicate points. Often he can by advice of change of scene, or by timely counsel, bring about that mental change in the woman which will make her more able to bear the vexations which have fallen to her lot. The following from Dr. R. Ludlam's lectures on hysteria, in his very valuable work on "Diseases of Women," strikes the key-note of what is to be done in these cases. He is speaking more particularly of women's lives as they promote this disease in boarding houses, a very hot-bed for the malign influences. "Thousands of women would be cured of the hysterical tendency if they were blessed with comfortable homes and removed permanently from the corrupting influences to which they are otherwise subjected. It is sometimes absolutely essential to remove them from a house in which everybody knows everybody's business, and in which no woman has any business. You can also accomplish a great deal by the exercise of a little tact in keeping these patients busy with something useful, instructive, and profitable. One may perhaps become interested in a course of reading which you shall map out for her, another might be made to forget her complaints if she were to resume music, her French, or her German, or to participate in one or another charitable object in which some of the best women of our day are so engrossed. One should see more of society, and another less. All need some kind of diversion, some mental occupation, some change which shall divert their thoughts from themselves, and especially from a morbid stimulation and gratification of the sexual appetite."

The physician who attempts to guide the mental conditions of the hysterical patient will need an infinite amount of tact. He must have a real sympathy with her in order to command her confidence, and without it he can do little for her. He still must not let his sympathy run into sentiment, or in any way become exaggerated, for then he only feeds the morbid flame. If he is harsh in manner he may repel confidence and lose his only chance, perhaps, to influence her in the line of her welfare. Firmness he must have, such as will cause her to put forth her endeavors to carry out in good faith his instructions. If he is not able to enlist her honest efforts to regain health, he will be able to do little for her. No physician can succeed in fulfilling these requirements with every hysterical patient; and when he becomes satisfied in his own mind that he cannot command harmonious action with the patient, he had better withdraw from the case. In some cases to not only refuse to treat the case, but to advise those directly in charge of the patient to have no other physician, is the best treatment, for the morbid love of sympathy and notoriety is stimulated by too frequent visits from the physician, no matter how earnest his desire may be for the patient's recovery. The wish to be considered a very interesting patient, a strange, peculiar case, may be at the root of the patient's mental condition.

Coincident with the hysterical condition there is very frequently one of lowered tone of the general health. Anæmia exists in the majority of cases either as a primary or secondary condition. The disease will continue or increase while a condition of anæmia is present. It is therefore necessary that all such conditions as tend to produce anæmia should be carefully sought out and corrected. For this purpose no means are more important than the dietetic and hygienic. Fresh air, sunlight, out-door exercise, but not carried to the point of exhaustion, a carefully regulated diet, matters of mental interest, with cool or cold salt-water baths, are among the most potent influences with which to tone up the system. In many cases all this may be better brought about by the patient's going away from her home with its various vexations and cares. A visit to the sea-shore, or to the mountains, or to some spring, and especially the ferruginous springs, may prove of great benefit, and more especially if it takes her away from those members of her family who may have become irritating to her. In some extreme cases the rest cure, as carried out by Weir Mitchell, would give the best results. But it should be distinctly understood that these sojourns from home are not to be in places of fashionable resort, and that the mental hygiene is to be as carefully selected as the physical. Where there is any physical difficulty keeping up the ill health, this must receive proper treatment, and in these conditions will most often be found the leading characteristics by which to select the proper medicines.

Among the most frequent disturbances to which the physician will need to pay especial attention will be those of the genital organs, the aggravation of the hysterical condition being very prone to take place at the time of menstruation. Menstrual irregularities must therefore be corrected, and if the symptoms point to any intra-pelvic disturbance, its nature must be carefully sought out, and relief promptly given. If local treatment is required, no hesitation should be felt in adopting it, but it is not all irritations and hyperæsthesias that will require this, and unless required it is especially apt to aggravate the general symptoms if applied.

The local symptoms must needs have various treatment according to their particular nature. The paralysis may be cured by such mental and moral means as have already been indicated. Any form of treatment which will act upon the mental condition of the patient to convince her that it is in her power to move the paralyzed part will often succeed. Faith cures are here as real as any other cures. It matters not by what means the faith is brought about, by prayers, by holy water, by pretended magnetism, by the word of command, "Take up thy bed and walk,"—any or all of these means, so they insure the faith of the patient, will be effectual; but unless that faith is brought out, the attempt to relieve the paralysis by such means will be abortive, and only bring discredit upon him who attempts it. The rubbing and kneading of the muscles, with the passive movements of the joints, and at the same time encouraging the patient to make voluntary effort, will in some cases succeed. To these measures may be added the electric treatment both with the faradic and galvanic current. Whether these act otherwise than by the psychical influence has been questioned, but from a practical point of view it may be unimportant as long as they cure. Electrical treatment may also be of equal use in the anæsthesias. Here the electric brush and the faradic current appear to work best. Discs of various metals applied to the anæsthetic places will in many cases relieve them, and in some cases transfer the anæsthesia to the opposite side. Contractions may be overcome by the continued galvanic current, or by the influence of anæsthetics. It will be better in many cases to apply some apparatus to prevent their return, and to treat the parts with the proper application of the movement cure.

Ischuria can be relieved by the catheter. It is advised by some authors that there should not be much delay in resorting to this, but it must be used with discretion, and the patient encouraged to urinate with voluntary effort. Unless the physician uses discretion in this matter, the very pernicious habit may be established which will cause him much annoyance as well as be detrimental to the patient. Warm sitz-baths or a free enema will many times relieve the difficulty, especially if used with assurance and encouragement to the patient. Cantharides, Belladonna, Hyoscyamus, and Apis are medicines which will prove useful in this condition.

The vomiting, which is occasionally a very obstinate symptom, can sometimes be overcome by the patient's eating bits of ice or sipping some of the carbonated waters, or even hot water. Champagne will sometimes be well borne by the patient when other means fail. Ipecacuanha, Arsenic, Belladonna, Iris, Ignatia, and Nux vomica will be found the best remedies.

The anorexia yields in most cases as the general symptoms improve, but as it often presents itself as a symptom standing in the way of better nutrition, it must receive the physician's careful attention. Milk and cream form a diet which does not tax the digestive organs, and is highly nutritious. It has the advantage that it can be taken frequently and in small quantities at a time. In other cases the patient will take with advantage raw meat plentifully covered with pepper. In all cases the appetite should be encouraged in all reasonable ways.

Either Belladonna, Collinsonia, Lycopodium, Nux vomica, Silicea, or Sulphur will be found useful in overcoming the constipation. Due regard to the diet, and massage for the bowels, should not be omitted. The habit, too frequent among this class of patients, of resorting to cathartics is to be deprecated. Enemas may give temporary relief.

Lycopodium, Nux moschata, and Carbo veg. are among the best remedies for the tympanitis.

The following medicines have proved of use in removing or modifying the hysterical diathesis: Belladonna, Ignatia, Caulophyllum, Agaricus, Hyoscyamus, Lilium, Gelsemium, Ether, Moschus, Valerian, Asa fœtida, Tarantula, Platina, Silicea, Sepia, Calcarea, Pulsatilla, and Sulphur. Many other medicines may be called for, but they will be suggested by the particular indications of the underlying weakness or disease that may act as the exciting and sustaining cause of the hysterical condition.

The treatment of the hysterical paroxysm has already been hinted at in the preceding paragraphs. The excitement about the patient must be stopped, and only the necessary attendants must be allowed to remain with her. The amount of force used in restraining her during the convulsive action should be no more than will keep her from hurting herself, and it should be applied with as little appearance of anxiety as possible. Any over-anxious person should be dismissed from the room. The cooler the physician keeps, and the more he is able to control the other attendants, the sooner the paroxysm will cease. Pouring cold water over the patient, giving her emetics, stopping her breath for a short time by holding her mouth and nose until she must draw a long breath, have all been tried with success; but such measures are only applicable to particular cases, and are not well looked upon in private practice. In some cases a few whiffs of ether or chloroform will put an end to the convulsion and quiet the cries of pain. It is well to attract the attention of the patient from whatever emotional cause has been the immediate cause of the attack,

and then give one of the following medicines acc
tions: Belladonna, Ignatia, Asa fœtida, or Mosch

Firmness and skill on the part of the physici
put an end to these scenes in a comparatively
that he can keep over-zealous friends from undoi
he can do it.

DISEASES OF THE ORGANS OF LOCOMOTION.

ACUTE RHEUMATISM.

BY J. T. O'CONNOR, M.D.

Synonyms.—Rheumatic fever, Acute articular rheumatism, Polyarthritis rheumatica acuta.

Definition.—A constitutional disorder whose chief features are inflammation of the joints and of the parts immediately surrounding, fever, accompanied by profuse acid sweats and, frequently, inflammation of internal organs, notably of the serous membranes.

Ætiology.—The conditions which are by general consent considered as favoring the occurrence of rheumatism may be divided into two classes, *i. e.*, those belonging to the individual, and those pertaining to his environment.

In the first class the conditions may be grouped together under the terms: inherited tendency, age, sex, and altered state of the general health.

Dr. Fuller's statistics show that of a number of patients whose antecedents he had traced, 29 per cent. had rheumatic parents, and Dr. Garrod found in 25 per cent. a hereditary predisposition to the disease. Statistics, however, on this point, should be received with great caution, and until we can eliminate from our problem the presence or absence of similar external causes acting upon both parent and offspring, the mere fact of the child's having had a rheumatic parent can only possess an indeterminate value.

The relation of age to the disease is remarkable; the young, especially between the period of puberty and the twentieth year, are most frequently the victims of acute rheumatism; next in order are those from the sixth year to the time of puberty, and from the latter to the thirtieth year.

The occurrence of acute rheumatism in children under four years of age is extremely unfrequent, and beyond the fiftieth year a primary attack of the malady is as great a rarity.

The value of sex as an ætiological factor has not been ascertained with preciseness; indeed, statistics under this head vary somewhat, and as they are made up in great part from hospital data, it is well to bear in mind Longstreth's observation that "in every community, and especially in the large cities, more men seek hospital care than women, and this even when in the general population the number of women exceeds that of the men."

In general, the female is less exposed to the exciting cause of rheumatism, and medical writers lean to the opinion that males are most frequently the subjects of the acute disease.

The view held by some writers that after the change of life women are equally subject with men to the disorder is of little value, since at the time of life when this change occurs a first attack of acute rheumatism is seldom seen.

An impaired state of health has already been assigned as a predisposing cause of the disease, yet, when we examine the statistics we find that it is most rife at that period when the bodily functions are in vigorous action; nevertheless, it is believed that an attack is greatly favored by any active cause of debility. Garrod finds the disease to occur frequently in women who have been exhausted by excessive lactation, and Senator states that women who have lost much blood during labor are especially liable to it.

Among the ætiological factors of rheumatic fever external to the individual, perhaps the most potent is the combined influence of cold and dampness, and in regions and seasons in which these circumstances are found as atmospheric conditions cases of acute rheumatism are most frequent; similarly the accidental occurrence of exposure to this cause, as in permitting wet clothing to dry upon the wearer, has been followed in repeated instances by an attack of the malady.

The influence of other diseases in inviting an invasion of acute rheumatism has not been accurately determined, but is believed to exist in scarlet fever and dysentery. In the former, rheumatic fever has been observed to ensue before the completion of desquamation; in such cases the skin is in an over-sensitive and weakened state, and offers feeble resistance to the action of cold and moisture.

The appearance of rheumatic fever after an attack of dysentery is mentioned by authorities as a not uncommon occurrence, but the explanation of the fact remains to be established.

Occupation and mode of life are considered, broadly speaking, to rank high in value as causal factors in the production of the disease, but a close examination will show that all these occupations considered to be productive of rheumatism possess the common condition of exposure to moisture and cold. Hence, persons at laborious work in the open air, those who work in water to any extent, engine drivers and firemen, and others exposed to a high temperature, can all be included under the same head.

The influence of cold and moisture combined seems to be the determining one in by far the larger number of cases of acute rheumatism, and it must be remembered that these two factors may be present in different modes.

Most writers consider rheumatism as specially a disease of temperate climates, but data for more detailed analysis have not been gathered.

Pathology.—As the disease is not merely an inflammation of the joints and contiguous structures, pathologists have sought to explain the general phenomena of rheumatism by asserting the presence within the circulating fluids of the body of some substance acting as a *materies morbi.*

The strongly acid sweat of this disease was accepted as the effort of nature to rid the body of some peccant material, and a number of writers, headed by Prout, have stoutly maintained that the offending matter is lactic acid. It is known that one, and probably two, of the lactic acids exist in the plasma of muscle, and under normal conditions are decomposed in the blood with the formation of alkaline carbonates, while in some disorders in which the process of oxidation within the economy is deficient, as in some forms of dyspepsia, fever, and lung troubles, the acid may be found in both blood and urine; at least one investigator claims to have found lactic acid unaltered in the sweat. It will thus be seen that much can be said in favor of the theory that the phenomena of acute rheumatism are dependent upon the accumulation and retention within the system of the acid in question. Further, Richardson injected lactic acid into the peritoneal cavity of dogs, and found that there followed both peri- and endo-carditis; German observers, however, have generally refused to accept Richardson's results as correct.

Dr. Foster found that the prolonged treatment of diabetic patients with lactic acid, administered by the stomach, produced symptoms similar to those of rheumatic fever, and that the symptoms disappeared when the ingestion of the acid was suspended. Kuelz's observations of the same kind, upon a diabetic patient, gave similar results.

Other theories have been advanced to account for the presence of rheumatic fever, among which may be mentioned the view that the disease is infectious in its nature, the opinion that the nervous system is, or parts of it are, primarily affected by the initial exposure, the inflammatory hypothesis, etc.

While the causation of the disease within the organism is as yet undetermined, it may well be admitted that the effect of cold and moisture upon the surface of the body may be transmitted to certain nervous centres, with derangement of function of such centres and consequent phenomena of the disease in question. The indications for rational treatment must in all diseases be to restore to normal action the disordered organ or organs which are primarily at fault, not merely to neutralize or eliminate from the body the substances which are only effects of such aberrant performance; hence the search for the initially offending organ rather than the determination of any specially abnormal constituent in the fluids of the body would sooner lead us to a knowledge of the real pathology of rheumatism.

Symptomatology.—From the time of exposure to the exciting cause of rheumatism until the actual outbreak of the disorder a day or two generally elapses, during which the patient experiences some feelings of discomfort, malaise, or even pains in the limbs.

This period is in no sense one of incubation, nor is it one of latency; it may be held that the abnormal processes started by the exposure are gradually increasing in amplitude and intensity, until at the end of the time mentioned they have affected the system generally. The first acute symptom then observed is a state of chilliness accompanied, in many cases, by shivering, or in some by a well-marked rigor. In a small number of cases the rigor may be repeated.

An increase of the body-temperature then follows, in some instances to 104° F. at first, but in a large number of cases this height is only reached gradually; in a fatal case in which thermometric observations, as taken by Ringer, are given by Aitken, 104° F. was not reached until the fifth day. Thermometry affords no help in this disorder ordinarily in forecasting either the duration or the intensity of the attack, the variations of temperature being practically as erratic as the symptoms of the joints. In cases in which cerebral symptoms of alarming gravity appear, the unwelcome complication is ushered in with a marked increase of temperature, and the latter may mount in a few hours, in fatal cases of the kind mentioned, to a height absolutely startling; under such circumstances a temperature of 111° F. has been recorded.

With the rise in temperature other symptoms of fever set in, and increased frequency of the pulse and respiration with thirst, loss of appetite, and, in severe cases, a thick, creamy furring of the tongue, point to a general systemic invasion.

To the hand of the attendant the skin of the sufferer gives the sensation of abnormal warmth, but the quality of burning dryness present in some other disorders is lacking.

The connection in point of time between the outbreak of the fever and the local affection of the joints is not a constant one. In some cases the joints are painful before pyrexia is evident, in others the two conditions appear simultaneously, or nearly so, but in the greater number the joint-affection is not complained of until some twenty-four or forty-eight hours after the general signs of fever are apparent.

Accompanying the pain, or in a short while after, the affected joint displays the objective signs of inflammation—heat, redness, and swelling, but in the case of joints so deeply buried beneath the surface as are the vertebral articulations such signs are neither visible nor tangible.

Generally, but one or two joints are at first affected, and these of the lower extremity; and it is the peculiarity of rheumatism that the larger joints only are at first attacked, the smaller joints, such as those of the fingers and toes, not being involved, if at all, until a late period in the disease. After some time—it may be some hours—another joint, or set of joints, becomes inflamed, and the onset of trouble in the newly affected parts is in marked contrast with the speedy subsidence of symptoms in that at first invaded. The succession in which the joints exhibit their yielding to morbific force is not only without order, but is, on the contrary, erratic; the trouble shifts its location, so to say, from a lower to an upper extremity or to an opposite side of the body in the most capricious manner. Notwithstanding this, observers have deduced from a number of cases the fact that certain joints are more readily affected by the disease than others, and Monneret found that in 93 cases the knee joint was affected in 69, the wrist in 49, the ankle in 41, the shoulder in 19, the hip in 8; the finger joints come next in frequency, then the articulations of the spinal column, then the toes. The articulation of the lower jaw as well as the crico-arytenoid have been seen attacked.

The length of time during which the acute stage of inflammation lasts in any one joint can not be given with exactitude; in some instances the symptoms are greatly ameliorated within two or three days, in others not until seven or eight days have passed, and it must be remembered that a joint may be attacked more than once during the progress of acute rheumatism.

The duration of the disease from the first onset of fever until convalescence is fairly established cannot be defined; indeed, so much depends upon the intensity of the disease-process as well as upon the number of foci of inflammation that statistics giving merely the length of time during which the disease lasted, without dwelling upon the points alluded to, are greatly lessened in value.

Senator grades cases according to the number of joints involved and to the length in time of illness, so that he uses the latter as a factor in determining the severity of the attack. He calls those cases mild in which three or four joints at most are inflamed and in a moderate degree, and finds that such cases last about two weeks. When from four to seven joints are affected and the duration of illness is from three to five weeks, the disease is viewed as one of medium severity, and a severe case is one in which from eight to twelve, or more, joints are implicated and which lasts longer than six weeks.

Of English writers Garrod considers the usual duration of the disorder to be from ten days to three or four weeks, but he finds cases now and then which terminate spontaneously in five or six days, and others which run a course of six or even eight weeks.

In Flint's twelve cases treated at Bellevue Hospital and reported in *Amer. Jour. of Med. Sciences*, 1863, the mean duration of the disorder was twenty-six days, the lowest was twelve, the highest fifty-six. The data given above are from cases uncomplicated by affections of the internal viscera.

The pain in an inflamed joint in rheumatic fever is excruciating, in fact only less so than in the acute stage of the gouty toe; it is aggravated, or perhaps it were better to say is at its greatest severity, during motion or when touched. In severe cases voluntary motion, depending, even remotely, upon the affected joint, is withheld by the sufferer or becomes practically impossible. The pressure of the bed-coverings cannot be borne and, withal, there seems to be a special local tenderness impelling even the bravest patient to shrink from the gentlest touch of the physician's hand.

The vibrations of the floor, communicated through the bed to the inflamed joint when walked upon, try the fortitude of the invalid, and the effort to keep the painful joint in a position to minimize the effect of such causes of aggravation is not the least among his trials.

The redness of the inflamed joint may be only a slight flush, or it may be dusky in tint; its lessening, or even disappearance, frequently occurs before any marked abatement of the pain, but usually the subsidence of the two symptoms is at the same time.

The swelling is generally great, sufficiently so, at least, to place the normal outlines of the affected joint beyond visual recognition. In these, effusion within the synovial cavity is the rule, but the periarticular structures are always more or less the subject of inflammatory as well as exudative changes. A remarkable feature in this connection is the great rapidity with which the effusion is absorbed when amelioration of the joint-symptoms once begins. The skin about the part is more or less tense, but rarely enough so to cause a shining appearance, nor does it afterward pit on pressure or desquamate at the close of the attack: these phenomena belong distinctively, as a rule, to gout, while the presence of enlarged veins about the inflamed joints is more often and more markedly noticed in gout than in rheumatism.

A special feature in rheumatic fever is the sweating, which begins shortly after the accession of a high body temperature: at first it may be partial, but soon it bathes the whole body, and gives no relief to the patient. It is acid to test-paper, and has an odor which is both acid and acrid, as has been pointed out by Garrod. The peculiarities of the odor probably are not alike in any two individuals, but it is generally sour and offensive. With the lowering of the body temperature this peculiar sweat lessens in amount, but a rise of the former is generally speedily followed by an increase of the latter. The value of this excretion as a means of getting rid of the *materies morbi* has been greatly insisted on by a number of observers, but it is admitted to be in no sense a critical sweat. In prolonged cases, or in those which show evidences of marked constitutional weakness, the character of the sweat becomes distinctly altered; it loses then in great part the characteristic odor and reaction, the skin becomes macerated and cold, and the pulse weak and irritable; in short, this transudation is only one of the evidences of lowered vitality, which, indeed, it further reduces.

The effect of the abundant passage of water through the skin necessarily reduces the amount of that fluid eliminated by the kidneys; and, as in all fever processes the aqueousness of the renal secretion is greatly lessened, so in rheumatism the volume of urine passed in twenty-four hours is notably decreased, until in some cases only one-fifth of the normal quantity is discharged.

The color of the urine is distinctly reddish, or it may be even dark red; its specific gravity is high, at times reaching 1030, or higher; its acidity is much increased, and it precipitates on standing a brick-dust deposit of crystals of uric acid and of sodium urate. The total solids of the urine are below the normal, with the exception of urea, which, as a result of excessive tissue metamorphosis, is not only relatively, but often, when the disease is at its worst, absolutely augmented.

The only change in the constitution of the blood in rheumatic fever is an increase in the proportion of fibrin in a degree correlative with the intensity of the fever; as the disease progresses anæmia supervenes, and the tendency to this blood-change should be kept in mind.

The appearance of the patient is one of extreme suffering, and, as has been pointed out by Longstreth, there is a turgidity of the face due to actual physical effort at repressing the slight change of position produced in certain of the inflamed joints by the respiratory movements. In addition there is an air of watchfulness upon the face indicative of the invalid's readiness to resist any motion or touch of the affected parts.

When by happy fortune the suffering members attain a position of rest, the patient is in comparative ease, and the countenance then gives evidence of the fact. In many cases the desire to evacuate either bowels or bladder is repressed as long as possible, through dread of pain produced by the motion necessary for that act.

Among the complications of the joint-affection the most important are those implicating the heart, but the numerical proportion of cases of acute rheumatism in which heart-involvement occurs cannot be formulated, nor is it possible to determine the character of the attack in which cardiac mischief ensues. In general it may be stated that the tendency to heart-complication in rheumatic fever is greater in the more severe forms of the disorder, but that no case is so mild as to be exempt from the possibility of serious cardiac lesions, and none so aggravated as to insure their occurrence. This view is to be judged side by side with the fact that in certain seasons or years the majority of cases show inflammatory action in the heart, while in others the reverse obtains. Besides, most allopathic writers concede that certain methods for treatment in the earlier stages of the disease have a great influence in lowering the numerical frequency of heart-implication. One factor there is, however, whose value cannot be expressed with exactness, but which is nevertheless very great, *i. e.*, youth. So great indeed is the tendency to heart trouble in the young when attacked by acute rheumatism, that Senator lays it down as a law, that the younger the patient, the greater the risk of his heart becoming affected, that this risk is greatest before puberty, and that it continues great until about the twenty-fifth year; after that age it is lessened, but does not disappear wholly.

As to the causation of the cardiac affection in rheumatism we need only seek for it in the known affinity of the rheumatic process for serous membranes; the doctrine of metastasis has been invoked to explain the occurrence at least of the phenomena in question, but it is not applicable. In gout there is a real retrocession, not, it is true, of the disease-process going on in a gouty toe to the heart, but probably of some abnormal nervous activity which, prevented by injudicious local interference from expending itself upon or at the place of election, is directed backward to its centre of origin, and is then given a new direction. The late Dr. Hering has promulgated, as a law, that the new direction will always be towards a more vital organ than the one originally attacked. In rheumatism, however, so many cases have been observed in which the heart-affection was the beginning of the disease, and so many others in which the cardiac phenomena have been seen to occur without any abatement of the symptoms of the inflamed joints, that metastasis must be ruled out.

The heart complications of acute rheumatism are inflammatory in their character, and include pericarditis, endocarditis, and myocarditis. Any two of these may be present at one time, or, indeed, all three, but in cases of much severity the heart-muscle is rarely unaffected. The ratio of any one of these forms, in any number of cases, cannot be determined, the physical signs of one lesion often obscuring the presence of the other, and, on the other hand, the presence of inorganic or functional murmurs is anything but unfrequent in rheumatic fever; hence there is need of repeated physical examination before the physician can be sure of his diagnosis; but where the patient is in great distress, as well as in evident peril, we have reason to suspect pericarditis even before applying the stethoscope to the chest.

For the differential diagnosis of these disorders the reader is referred to the section treating of diseases of the heart.

The other secondary and complicating affections in the course of acute rheumatism are, chiefly, pleurisy, pneumonia, bronchitis, and meningitis. Oftenest seen among these, although far less frequently than cardiac trouble, are pleurisy and pneumonia. The pleuritic affection seems to select the left side in the majority of cases, and double pleurisy occurs now and then; it is believed that when this disease arises as a consequence of rheumatism it rarely becomes empyema, but is more commonly adhesive in character than when consequent upon other causes. Sudamina are not uncommon in rheumatic fever, as might be expected in a disease exhibiting such marked activity of the skin. The only other cutaneous affection worthy of note as a complication is urticaria.

Diagnosis.—The diagnosis of acute rheumatism is not difficult in general; in cases in which the local manifestations of the disorder are in deeply-seated parts—and these are not frequent—or in which the heart or other organ is at first attacked, it may be necessary to await further development of the disease-process before an opinion as to its character can be given. It may be compared with gout, acute rheumatoid arthritis, gonorrhœal rheumatism, pyæmia, and trichinosis.

From gout it is, ordinarily, easily distinguished by the differences already noted, and by the fact that the latter disease selects its victims from persons in mature or advanced age. Moreover, the presence of uric acid in the blood, which is so characteristic a feature of gout, is wholly absent in rheumatism, and the profuse acid sweats of the one find no place in the other.

From acute rheumatoid arthritis the sweats, the tendency to cardiac complication, the shifting type of local inflammation as well as the evidence of some cause acting profoundly upon the organism as a whole, suffice for diagnosis.

In gonorrhœal rheumatism there is the antecedent history of urethral discharge or irritation, the joint-symptoms are not erratic, and there is often left long-lasting injury to the articulations affected. Gonorrhœal rheumatism is considered by many as essentially pyæmic in its nature, and pyæmia in its commoner forms has been mistaken for rheumatic fever; with the light of the present day such a confounding of the two diseased states ought not to occur unless the evidence of a previous suppurative lesion cannot be obtained. Even then the difference between the two is well marked. The repeated and more severe rigors in pyæmia, the tendency to prostration and, it may be, to cerebral complication, as well as the known proneness to suppuration in pyæmic joint-affections, together with the absence of the acid sweats, will enable the physician to separate clearly the two diseases.

Trichinosis could hardly be mistaken for acute rheumatic fever. However, it may be in the beginning erroneously diagnosticated as acute muscular rheumatism.

Prognosis.—The immediate issue is most favorable in rheumatic fever. Aitken states that of all cases of death, from all causes, in England, only one in a thousand is from rheumatism; he further estimates the mortality of the disorder as about one per cent. Senator, however, believes the death-rate to be about three and a half per cent. The latter writer is of the opinion that in the great majority of fatal cases death ensues with a sudden rise of temperature, accompanied by cerebral symptoms, a smaller proportion being dependent upon cardiac complications; Garrod is of exactly the opposite opinion.

The future health of a patient who has recovered from rheumatism depends almost exclusively upon the amount of damage, if any, which the heart has sustained during the attack. As such is oftenest found in the young suffering from rheumatic fever, the age of the patient must enter our calculations in making a post-morbid prognosis, and there is good authority for believing that a patient whose age is over twenty-five or thirty, having the disease for the first time, will, generally speaking, recover without bearing a legacy of cardiac injury. Where there has been a previous attack, the dictum just given does not hold good, nor is it applicable when the progress of the disease has been markedly prolonged. A pre-existing heart-affection renders the prognosis extremely grave, no matter what may be the age of the patient, as it is found that an acute rheumatism almost invariably causes a notable increase of the cardiac trouble.

Treatment.—The preventive measure which would naturally first suggest itself against contracting rheumatism is to avoid exposure to cold and wet, or to draughts of air, or to a lower temperature when perspiring. But in many cases, if not in most, these exposures are unavoidable, as in certain occupations, travelling, etc.

The exposure having been sustained, it remains to neutralize its effects, and this is to be done by keeping in active motion until the individual is able to make a change of clothing, and when doing so to produce friction over the whole surface of the body with a rough towel or flesh-brush until the skin is dry and glowing. If the exposure have been severe, the person ought to be put to bed, and if there seems to be delay in establishing the subjective sensation of warmth o body an alcoholic stimulant may be given at the same time. In no case where there is the slightest apprehension of ill effects following ought the patient to be permitted to go out until after a good sleep.

A dose of Aconite, Rhus tox., or Dulcamara, or of some other appropriate remedy, may be given according to the symptoms and the kind of exposure to which the patient had been submitted.

If, in spite of all our efforts, the evidences of the oncoming attack present themselves, we must prepare the patient for some weeks' confinement. The sick-room should be well lighted and ventilated, its temperature moderate, and the bed should be as comfortable as the circumstances of the case permit. The bed-covering should be as ligh as is compatible with the feelings of the patient, and as motion i greatly dreaded by the sufferer, arrangements should be made to permit the calls of nature being satisfied without his leaving the bed

His food should be light, easily digestible, and, preferably, in a fluid form. To relieve thirst, which is considerable in this disease, water usually suffices, but should an acid drink be urgently demanded, weak lemonade may be allowed; alcohol in any form or in any strength should not be given.

The local treatment of the inflamed joints is a matter concerning which many experiments have been tried and many theories put in practice. The writer, in practice, has been guided on this point by the inclination of the patient; he has seen enveloping the affected articulation in cotton-wool most grateful to the sufferer, but he would hesitate a long time before ordering a cold compress as a local application in acute rheumatism. German authority is strongly in favor of cold applications, Stromeyer and Esmarch recommending the use of even ice-bags, claiming that thereby the inflammatory process in the joint is much lessened in duration. English writers use just the opposite treatment locally, and Chambers prescribes that patients are to be enveloped in woollen blankets without body-clothing, unless it be a muslin shirt. The claim for this method is that it reduces the tendency to heart complication by 75 per cent., and does not prolong convalescence.

In prescribing for rheumatism, as well as for any other disease, the physician must be guided not only by the totality of the symptoms as such, but also by the special phenomena which present themselves to his observation. Hence, to give the therapeutics of this disease would require much more space than is available. It will suffice to point out the remedies which have oftenest been found of signal service in the disease. Of the greatest value are Aconite, Arnica, Belladonna, Bryonia, Chamomilla, China, Mercurius, Nux vomica, Rhus toxicodendron, Asclepias syriaca, Caulophyllum, Cimicifuga, Veratrum viride. Of less frequent use are Ammonium causticum, Apocynum androsæmifolium, Antimonium crudum, Cactus (especially with heart complications), Hamamelis, Ledum, Spigelia (with heart complications), Sticta, Sanguinaria.

The following have been found of value at times: Arsenicum, Chelidonium, Colocynth, Dulcamara, Ferrum, Formica, Ignatia, Lobelia, Manganum, Nux moschata, Ruta.

Aconite.—High fever with thirst and great restlessness. The affected parts are red, swollen, and extremely sensitive. The pains shooting or tearing. Anxiety and fearfulness are marked.

Aggravations are at night. The remedy is mostly applicable in the beginning, or when cardiac complications first appear.

Arnica.—The swollen joints are apt to be pale or rose tinted. The pains are as if dislocation were present, or as if the part were crushed, and the tenderness to the slightest touch is extreme. Mentally there is irritability with fear of being touched, and, owing to the exaggerated sensitiveness, complaints are made that the bed is too hard.

Belladonna.—The swollen joint is red, somewhat shining, and the area of redness is unusually extended. The pains are shooting and often burning, and may be tearing and jerking. Marked congestion of the face is often present with redness of the conjunctiva.

The fever is high and the dryness of the skin conveys to the hand of an observer the sensation of burning heat.

Bryonia.—The swelling is often pale red or with a barely perceptible redness radiating outward. The pains are tensive, often tearing, and on the slightest motion a sharp pain shoots through the affected part. Headache mostly frontal, while bilious or gastric symptoms may be present. The fever heat is great, or it may be replaced at times by coldness and shivering, or by the sweat.

Mentally the patient is easily vexed and inclined to anger.

Chamomilla.—The mental symptoms with the marked inability to bear pain, together with the nightly aggravations, are the chief conditions calling for the use of this remedy. A feeling of deadness and lameness of the affected parts, which are burning hot. High fever with hot sweat on the head and a nervous state, characterized by intense restlessness of body and limbs, are symptoms peculiar to this remedy.

China.—Indicated when the attack has ensued after hæmorrhages or prolonged lactation or other exhausting influences. The swelling is pale in tint, and the sensitiveness is more marked to a light touch than to a somewhat firm pressure. Paralytic weakness in the affected part. Tendency to profuse sweats.

Mercurius.—The swelling is generally not red, is apparently œdematous, or as if about to suppurate. The pains are in the joints or bones, and are sticking or tearing. There is a general aggravation at night, and lasting often till morning. The sweat is annoying by its warm clammy quality, and it has often a musty odor. In addition, the broad, flabby, indented, coated tongue, the foul breath and the little tendency of the joint affection to shift are strong indications for this remedy.

Nux vomica.—This remedy, although oftener called for in acute rheumatism affecting the large muscles of the trunk, chest, and back, may be indicated when a large joint is attacked. The swelling is pale red and very sensitive to touch, as is the whole surface of the body; the pains are as if bruised, often accompanied with numbness or twitchings in the affected parts. The patient dreads cold, and fears to have the affected part uncovered; transient chilliness is frequently observed.

Pulsatilla.—The swelling may be considerable, its color is rather pale, and the pains are tearing, jerking, boring, and frequently accompanied by twitchings in the affected member. The most valuable indications for the remedy are the marked prominence of the erratic behavior of the joint symptoms, and the chilliness often recurring with increase of the pains, yet with desire for cool fresh air. Aggravation in the evening and on moving the affected part after it has been for some time at rest.

Rhus toxicodendron.—The swelling of the joint is red, often shining, at times œdematous. The pains are tearing, burning, tensive, or as if dislocation were present, and the bony prominences are tender to touch. Stitching pains are often produced by slight pressure on the part. There is aggravation of the pain by continued rest of the part, and motion is resorted to for relief. The slightest degree of cold increases the suffering.

Salicylic acid.—The provings of this drug are not extensive, and the indications for its use in acute rheumatism are clinical. It is believed to be specially called for when the swelling of the inflamed joints is very great, and when the body temperature is extremely high.

Caulophyllum.—The smaller joints appear to bear the brunt of the attack.

Cimicifuga.—Oftenest indicated in muscular rheumatism, but is frequently called for when the joints of the lower limbs only are affected. The shifting of symptoms is well marked.

Colchicum.—Called for mostly in asthenic cases.

Additional therapeutic indications will be found at the end of the section on chronic rheumatism.

Sequelæ.—Independently of the results to be expected from the complications already referred to, the only sequel of the disease is anæmia of a greater or less degree. When the attack has been prolonged, there may be left a liability of the patient to a recurrence of the disorder upon slight exposure to its exciting causes, or the affected joints may not be restored to their normal integrity, chronic inflammation being left behind.

By many observers the occurrence of chorea has been noticed to follow a previous attack of acute rheumatism, and, indeed, for a time writers inclined to the opinion that in the majority of cases of chorea either rheumatism had formerly existed or that a rheumatic diathesis was present; later investigations, however, tend to prove that rheumatism as an antecedent of chorea is much less frequent than had been believed, and at present it is held that the proportion of cases of chorea dependent in any manner upon rheumatism is about 25 per cent.

SUBACUTE RHEUMATISM.

BY J. T. O'CONNOR, M.D.

This term is applied to cases which are comparatively slight in degree, and in which the accompanying fever is mild, transitory, or perhaps entirely wanting. The number of articulations involved is less than in the acute form of rheumatism, and their symptoms are much less severe. The swelling is not so great, redness of the region of the joint is generally not observed, and pain and tenderness, although present to a considerable amount, are yet more readily borne. The tendency to cardiac complication—so marked a feature of the acute form—is greatly decreased, and when observed, is found to be followed by much less permanent injury to the organ.

The duration of the disease is indeterminate; it may continue for even months with alternating changes of betterment or the reverse, and at times the severity of the local symptoms with the temporarily high body-temperature may be as great as in a well-marked attack of rheumatic fever.

Whatever be the duration of the disorder, there is left no permanent injury to the inflamed joint. This latter circumstance serves to differentiate this trouble from rheumatoid arthritis and chronic gout.

Subacute rheumatism is commonly found among those who are ill-nourished and overworked, and who, by their vocation, are subjected to the ordinarily exciting causes of the acute disorder; repetitions of the attack are not unfrequent, or an outbreak of the graver form may find place in the series.

From the relative mildness of the disease, its subjects give few cases to hospital statistics, but Longstreth believes it to be of exceedingly common occurrence.

The indications for remedies are to be found in the preceding section and in the therapeutics of chronic rheumatism.

CHRONIC ARTICULAR RHEUMATI

BY J. T. O'CONNOR, M.D.

Definition.—A disease frequently following the
often arising without such antecedent cause. It i
pain and tenderness of the affected articulations, g
ones, by the absence of fever and local swelling, an
to visceral complication. It is of indefinite durat
nosis, as regards recovery, is doubtful.

Whether the disease is purely a local one, or wh
rheumatism, but of low intensity, is a question up
writers are divided. Much may be said on each
but the readiness with which the ailment at times i
of local phenomena, and the accession of a febrile
panied by redness and swelling of the affected
grave doubt upon the former view.

Chronic articular rheumatism is a disease of the
and is found most frequently in those who are ex
narily exciting causes of acute rheumatism, especia
ness. Where it supervenes upon an attack of the
found that from some cause, whether inherent wit
dependent upon circumstances external to him, c
are not restored to their normal state, and that
treated of is left; or even after apparent recovery f
there is a faulty nutrition or impaired innervation
their neighboring structures bestowed as a legacy
the departed ailment.

Symptoms.—The tenderness of the affected jo
of is never absent or, at least, can be easily proc
pressure, and the aching is readily evoked by moti
many instances the effect of cold and damp weath
the pain until the latter becomes acute in degree.
may be enough swelling and heat of the part to ju
ing the affection as subacute.

At other times most of the symptoms disappear
and there may remain only the subjective sensati
ness of the joint and surrounding structures, notic
ing movement after a period of rest.

Fever is not among the attendants of the diseas
subacute condition is present, and it is during th
only that any heart complication is likely to occur

The pain frequently extends from the joint in
from extension of the inflammatory process to the
ing aponeuroses or to the connective tissue of the r

With the alternations of exacerbation and relative amelioration, this disease drags out its slow course; its subject is liable, even when in comparative comfort, to suffer severely from changes of weather, from slight exposures to cold, etc., from imprudent muscular exertion, or from a strain upon the joint which in health would not be noticeable.

After a time evidences of inflammatory change are observeable in the articulation affected; thickening of the fibrous structures of the joint takes place; increase of the synovial fluid with alteration of its character is often present, as shown post-mortem, and deformity of the part with more or less immobility remains.

The disease is without the, erratic features of acute rheumatism. Under exceptionally favorable treatment and improved surroundings recovery may occur, or at least no more joints become attacked; oftener, however, the unaffected articulations are successively involved until in some cases the patient is rendered practically helpless. Anchylosis is not an unfrequent sequel, and in rare cases atrophy of the muscles of the limb is superadded, when the implicated joint takes on the appearance of greater deformity than it actually possesses.

Diagnosis.—This is easily settled if we have in the history of the case an antecedent acute rheumatism from which the present disorder has developed. From traumatic and scrofulous affections of the articulations it may be distinguished by the absence of the causal factors found in them; it is likely to be confounded with rheumatoid arthritis, especially in the earlier stages of the latter. The number of joints involved in the former is usually greater and the deformity produced by it is much less than in the latter disease.

In the class of painful joint affections dependent upon diseases of the spinal cord or of the cerebrum, evidence of neurotic character is generally obtainable.

Treatment.—The hygienic surroundings of the patient should be improved. Dampness in the dwelling or excessive humidity in the atmosphere, especially where accompanied by a lowering of temperature, should be corrected by a change of residence.

Locally, the application of dry heat is of the greatest advantage unless the heart be diseased or senile changes in the vessels exist. With similar exceptions hot water baths are beneficial, although in a less degree, and an added value is given to each of these thermic methods when the application can be limited to the diseased joint and outlying structures.

The use of thermal springs in the cure of chronic rheumatism has been known for centuries; writers differ as to the value of the saline constituents of these waters, but agree as to the efficacy of the high temperature. Senator warmly praises the use of mud-baths at a high temperature, and is of the opinion that their curative influence is in some degree dependent upon the salts, gases, etc., which they contain, and which act as irritants to the skin, and so set up increased cutaneous activity; in like manner is explained, by some, the therapeutic value of the thermal waters.

A ready and cheap treatment, either general or local, can be given by the use of sand heated to a temperature as high as can be comfortably borne by the patient, and but little ingenuity is required to make a properly arranged receptacle of wood (as a non-conducting material) to permit a rather thick layer of the hot sand to completely surround the body or joint undergoing this treatment.

The tendency to immobility of the affected joints must be met by enforced passive motion when such can be made without much increase of pain; at the same time the joint may be rubbed with any non-medicinal oil or unguent of soft consistency. The effect of the manipulation and rubbing is to relax the tissues surrounding the joint, to increase the local nutrition-processes, and to assist the diseased structures in responding to the action of the properly chosen remedy.

General massage of the limb is to be assiduously used when the muscles are in danger of atrophy from prolonged inaction.

For therapeutics consult the following section.

MUSCULAR RHEUMATISM.

BY J. T. O'CONNOR, M.D.

Synonyms.—Myalgia rheumatica, Myo-rheumatism, Myodynia.

The **Definition** of this trouble is extremely difficult to give in a condensed form. After excluding diseased states formerly confounded with the disorder in question in which pain in the muscles is a prominent symptom, as in poisoning by some metallic salts, trichinosis, and the condition left-after excessive muscular exertion, there is still a number of conditions of pain and soreness in the muscles, either singly or in groups, which cannot be well classified in the present state of pathological knowledge. Some of these are by some writers denied membership in the family of the muscular rheumatisms, others, which have been generally accepted as rheumatic in their essential qualities, are believed to be of traumatic origin, vide lumbago, and others.

So little is known of the nature of muscular rheumatism that its **Ætiology** cannot be presented with absolute correctness, but it is believed that in well-marked cases of rheumatic myalgia the fibrous tissues surrounding the muscle and intimately connected with it, as the aponeuroses, fasciæ, intermuscular septa, and the connective tissue between the bundles of fibrils, are primarily affected.

The **Pathology** of the disorder is likewise in doubt. The condition of the fibrous envelope and its prolongations is considered to be inflammatory, but whether accompanied or followed by exudation of any kind is not known. Yet it is fair to assume that there is some increased vascularity.

The causal influence external to the patient is exposure to cold and dampness; but numerous cases of well-marked lumbago have arisen from apparently a simple, though excessive, strain of the lumbar muscles in lifting; hence Senator advocates the theory of traumatic causation in these cases, the injury being considered to be rupture of ultimate fibres or of fasciculi.

The affection comes on somewhat acutely, that is, with suddenness and more or less severity; often the patient's first intimation of the presence of the disorder is received on awaking in the morning, when the attempt at muscular exertion gives rise to extreme pain. The suffering part is without heat, redness, or swelling, and upon pressure a slight amount of soreness may be experienced. Fever is absent, the pulse is not altered or only slightly so, and the excretions are unchanged in character; in short, systemic sympathy is absent in ordinary cases. The simplest treatment, as the local application of warmth, gives great relief, and in a few hours, or a day, the patient is able to resume his ordinary duties with, however, a reminder now and then of his trouble in an occasional twinge of pain upon any unusual motion, *i.e.* which involves unduly or unexpectedly the affected muscles. This state may last for some days or some weeks.

In cases of great severity there is often pain in the affected muscles, even when the latter are in a state of repose, and then any attempt at motion causes great exacerbation of suffering. The continuance of pain interferes with sleep, and frequently gives rise to some amount of fever, with thirst and loss of appetite.

In such cases the symptoms are generally increased in severity toward nightfall.

Muscular rheumatism is divided by writers into varieties according to the topography of the affected muscles.

Lumbago, *myalgia lumbalis*, or *lumbodynia* is the term given to the disease when chiefly located in the masses of muscle on one or both sides of the lumbar region of the spinal column.

It is often caused by local exposure to cold or to cold and damp, as by sleeping on the damp ground or in a damp bed or under an open window, etc. But it is the one variety of muscular rheumatism which is often caused traumatically, as by stooping in a strained position, lifting heavy weights, etc.

The pain of this affection is intense when the attack is at all severe; any motion which calls for action on the part of the muscles implicated gives rise to intense pain described as teari ing.

Other diseases accompanied by severe pains in are, in the beginning, likely to be mistaken for t tism; this is especially the case in small-pox, at times cannot be clearly made out until the apr tion.

In some disorders of the kidneys lumbar pain to divert attention from these organs, but the wri seen a real lumbago present at the same tim marked renal congestion, both conditions being to the same exposure as the exciting cause.

In these, and other, disorders having lumbar symptom, the sudden onset of the pain, the his strain, together with the muscular tenderness or to separate the rheumatic affection.

Torticollis, *myalgia cervicalis*, *cervicodynia*, *crick i* matism of the cervical muscles, is usually produ air blowing for some time on the neck, by some cervical muscles, either by turning the head i direction, or by its prolonged retention in even a If the affection be unilateral, the head is held rot the sound side; if bilateral, or located in the dor head is held centrally and, as much as possib either case any motion is productive of great pai

Rheumatism of the pectoral and intercostal muscles, a *rheumatism*, or *pleurodynia*, or *myalgia intercostalis* not uncommon, is less frequently seen than th The pain affects the lateral aspect of the chest, an movements of the muscles in respiration or b involving the pectoral muscles when they are affe

The disorder has been mistaken for pleurisy neuralgia. From the former it may be known cough and fever and the physical signs of an infl the latter by the fact that the pain does not follo intercostal nerves, by the aggravation upon cou and by the absence of special points of tendernes

Other groups of muscles than those spoken of to attacks of rheumatism, and names have been them, as scapulodynia, dorsodynia, etc., but it is clinical advantage is gained by these additions to the disease.

The **Prognosis** of muscular rheumatism is fav any untoward issue or serious complication. Th to cardiac trouble, but at times it seems to pre to directly cause a neuralgic outbreak. A person once attacked by muscular rheumatism is extremely apt to have subsequent renewals of the disease.

Treatment.—The preventive and hygienic means of warding off this disease are practically those advised against the other forms of rheumatism.

During the attack much relief is usually obtained by hot applications by methods well-known among the laity. Hot flannel, a bag of hot salt or sand, ironing the affected muscles with a hot smoothing iron (the skin being protected by a layer of brown paper) are a few among the many means used. In very acute cases, where the tenderness of the part on pressure is greater than usual, the local application of heat is not well borne or is attended by exacerbation of suffering.

Any remaining stiffness of the muscles or impaired function may be benefited by massage or by the use of electricity.

In chronic rheumatism, whether articular or muscular, the remedies which may be called for are only limited in number by the extent of our provings; nevertheless, the value of certain drugs in these diseased states is greatly increased by the frequency with which they have been successfully used in practice.

Berberis.—Rheumatic affections especially of the lumbar and loin muscles. The pains are aching, laming, worse in morning. Of marked value when the rheumatism is complicated with renal, cystic or hepatic trouble.

Calcarea carbonica.—In chronic cases, with swollen and painful joints, with aggravation when the weather changes. Shoulders and arms and knees. This remedy is of the greatest value when indicated, but it must be prescribed according to the well-known general symptoms which are characteristic of it.

Causticum.—Marked aggravation from cold air, with corresponding amelioration from the warmth of the bed or room. Aggravation of the pains at night when there exists a specially noticeable restlessness. Rheumatic affection of the maxillary articulation and of the shoulders.

Cimicifuga.—In muscular rheumatism with much soreness; the pains are cramping or stitching. Rheumatic soreness of the muscular covering of the skull or of the cervical muscles, occasioned by exposure to a draught or to damp air. Aggravation of the pains by motion.

Colchicum.—Tearing pains in both muscles and joints, oftener in the smaller joints; pains feel as if in the periosteum. Aggravation by motion and at night. Marked feeling of muscular weakness, especially in the arms and legs, as if paralyzed. In long-lasting cases or in debilitated patients.

Dulcamara.—Rheumatism incident upon living in damp rooms or from cooling the body when heated, in cold damp places, cellars, ice-houses, etc.

Ferrum phosphoricum.—In chronic cases, especially in old persons. The shoulders and knees are especially affected. Pains extremely severe at night, preventing sleep. Marked stiffness on first moving after prolonged rest.

Hamamelis.—Rheumatic affection, especially of the muscles, often traumatic in origin. Muscles feel bruised with aching or tearing pain on motion.

Kalmia.—The joints are not usually affected. The pains affect a whole limb, are tearing, pressing or drawing, and result in a feeling of paralytic weakness with aggravation on motion and indisposition to move. Endocarditis. Pericarditis.

Ledum.—Pains in the joints, sticking, tearing, or throbbing; the joint-pains are aggravated by motion, torpid and numb feeling in the limbs. Want of animal heat, especially noticeable in the ends of the extremities, with n heat.

Lycopodium.—Tearing and aching pains in the e night and during rest. Rheumatism of the finger joints. quently indicated in chronic cases and in old people, and mu eral well-known characteristics.

Nux vomica.—Of especial value when the large mu involved; extreme sensitiveness to cold air, chilliness on mo with paralytic feeling in the affected part, together with mus symptoms and constipation are seldom absent.

Phosphorus.—Especially valuable in lumbago with to stand erect after stooping.

Phytolacca.—Chiefly indicated in chronic forms and had been used to excess. The pains are heavy, aching, ar damp weather; they may be shooting and lancinating, locality. The periosteum may be involved, especially in ca itic taint.

Rhododendron.—Chronic rheumatism of the small structures. Pains are digging and drawing, often felt in the disappear for, it may be, some days, but return at the appro stormy weather; they are worse toward morning and durin feeling often in single limbs, noticeable during rest, but a sli by great weakness.

Rhus toxicodendron.—Drawing and tearing pain on first attempting to move after a period of rest, with reli Aggravation from cold, from wet, from bad weather; amelio Lumbago.

GONORRHŒAL RHEUMATISM

BY J. T. O'CONNOR, M.D.

Synonym.—Gonorrhœal arthritis.

Definition.—An arthritis of one or more join appearance, during a gonorrhœa, subacute in ch duration, and with a tendency to subsequent i tegrity of the affected joints.

To Sir Astley Cooper is generally given the c called the attention of the medical profession to his time much has been written about the disorder, been a fruitful cause of discussion.

At present the belief that it is pyæmic in its ori eral one, although there are not wanting those joint-inflammation is set up by reflex irritation. not satisfactorily account for the symptoms of eve ponderance of evidence is in favor of the first.

Symptoms.—In from ten days to three week ment of a gonorrhœa, usually one knee joint—t than the right—is found somewhat stiff and pai tenderness to pressure, and without swelling or r

Ordinarily the course of the disease is slow an the marked evidences of acuteness that obtain Effusion takes place within the joint very grad days may elapse before the amount of distension is great enough to cause marked swelling or to give rise to pain severe enough to prevent sleep at night. When the swelling is at its height, or even before, fluctuation within the joint can be discovered by palpation.

As might be expected in a disorder classified as subacute, the local phenomena are less intense than those of acute rheumatism. The heat of the part is less, redness is often absent during the whole course of the trouble, and the pain, although great, is not of the excruciating character found in rheumatism.

Fever, if present, is very slight, and exists only in the beginning of the attack; the acid profuse sweats of rheumatic fever are absent, although abundant perspiration, debilitating in character and dependent upon pyæmic infection, have been observed; erratic shifting of the inflammation from joint to joint is not seen, nor does the joint affection subside rapidly, and there is no tendency to cardiac complication.

Rheumatic fever can occur during and without dependence upon a gonorrhœa, and this fact will explain the presence of phenomena which are purely rheumatic in what was supposed to be a gonorrhœal arthritis; indeed, this disorder should not be included in the rheumatisms, since it does not possess a single feature that is essentially rheumatic.

Exposure to cold and damp in any manner may precipitate an attack which the patient would have otherwise escaped, but this is, in a measure, true of other pyæmias.

In addition to the local manifestations of the disease already spoken of, both knee-joints may be attacked simultaneously or in succession; but the frequency with which other articulations are involved is very much less. Some few remarkable cases are quoted by Brodhurst in his article on gonorrhœal rheumatism in Reynolds's *System of Medicine*, in which hips, knees, ankles, shoulders, and some of the smaller joints were attacked. Such cases are, however, extremely rare.

The duration of the disease is indefinite; it may be over in a few weeks or it may last for months, or the effusion within the joint may remain long after every other vestige of the disease has disappeared. There is no tendency to pus-formation within the joint, but foci of suppuration may exist outside the articulation. Dislocation is a more common feature in this disease than in rheumatism, but anchylosis is the most characteristic sequel of gonorrhœal arthritis.

Subsequent attacks of the disease may occur, but only after a renewal of the original cause, or at least of some urethral discharge or irritation, and in them the symptoms, although objectively less severe than in the primary invasion, are accompanied by a greater tendency to long-lasting injury to the joint.

Women suffering from gonorrhœa are much less frequently attacked

by the joint inflammation than men under sim
owing, it is believed, to the greater thickness of the
of the genitalia of the former sex.

Diagnosis.—The history of a gonorrhœal infec
importance in making a diagnosis of the disease,
membered that a gonorrhœa may exist without
aware of the fact, and that, on the other hand, as
pointed out, a true rheumatism may set in durii
urethral discharge. The phenomena of the two d
in the preceding pages will suffice for further diag

Prognosis.—The prognosis is favorable as rega
mary cases, as regards the ultimate restoration of
a normal condition, but in a second or third occur
the chances of long-lasting or even permanent inju
tion are much increased.

Since, as has been shown, there is reason to lool
rheumatism, so-called, as a pyæmic process, it is w
selecting remedies for it, against being misled by
stricting our search to those drugs usually thougl
with rheumatism or with gonorrhœa; indeed, it w
in view the therapeutics of pyæmia, to which, in
referred. Our literature contains little concernin
the disease, and the remedies believed to be of se
Daphne indica, Sarsaparilla, Sulphur, Lycopodiun

Clematis.—Helmuth (*System of Surgery*, 4th edition) fin
specific when there is a tendency to orchitis, and the rheum
rapidly an attack of gonorrhœa.

Further indications from the same authority are:

Thuja.—Pains tearing, pulsative, or as if from subcutane
sation of coldness or torpor of the part. Aggravation from r
of the bed.

Veratrum.—Bruised feeling in the joints, lessened by
weak and trembling. Aggravation of pains by warmth of the

Actæa.—He finds Actæa racemosa to be the most valuabl
disease, and recommends Phytolacca, Kalmia, Gelsemium, i
pressed; Kali hydriodicum, Sepia, Euphorbium, Mercurius s

The Hot Springs of Arkansas have, in the san
a justly earned reputation for curing the disorder.

GOUT.

BY J. T. O'CONNOR, M.D.

Synonyms.—Arthritis erratica; Podagra, whe
gra, when in the hand; Gonagra, when in the kne

Definition.—A constitutional disorder characte
of uric acid in the blood, and manifesting itself b

intervals of a specific inflammation of one or more of the smaller joints, generally with the deposition of sodium urate in the affected articulation.

This disease was well known to the ancients, their medical writers, almost without exception, having given more or less elaborated descriptions of it.

Ætiology.—The ætiology of gout is a complex problem, more so, indeed, than that of many other diseases. Heredity, mode of life, age, sex, are all factors of great, but relatively changeable, value.

A hereditary tendency to gout can be shown in more than 50 per cent. of all cases of the disease; Garrod, whose writings upon the ailment command universal respect, estimates that 75 per cent. of those affected have inherited a predisposition to the disorder.

Mode of life is without doubt the most important of the ætiological factors in gout, for the disease has been kept at bay or has entirely disappeared under marked change of regimen and hygiene, while improper or excessive food, drink, etc., have in many cases caused the disease at ages and under circumstances which usually exclude its origin.

The popular belief that gout is a disease of the luxurious and wealthy has much foundation in fact, but it will be seen that excesses in the use of certain classes of beverages among the hard-working poor are directly chargeable with the causation of a large number of cases.

The influence of food is one whose importance cannot be approximated, for not only must the kind of food, whether chiefly animal or vegetable, be determined, but the state of the digestive organs and respiratory functions is to be taken into account. As the presence of urate of sodium in the blood is admittedly the essential phenomenon in the disease, to whatever causes this abnormality, whether it be excess in the amount of food taken or deficiency of oxidation processes within the system, must be laid the gouty condition. At the same time most writers hold that an excess of animal food is the commonest dietetic cause.

In a very interesting and thoughtful article by Dr. Alexander Hadden, in *N. Y. Med. Record*, vol. xvii., page 421, an earnest effort is made to controvert this view. He quotes from Sir Thomas Watson that butchers are rarely afflicted with the disease, although they are great consumers of meat, and that men and women of sedentary habits are not especially apt to suffer from gout, while on the other hand, the huntsman, a free liver, but taking an abundance of exercise in the open air, does so suffer. Dr. Hadden further cites the practice of Dr. H. Bentley Todd (1843) who, in the treatment of gout, recommends the employment of a moderate amount of animal food and, at the same time, the abstention from all vegetables having saccharine properties, or which might be prone to acetous fermentat and duodenum. Dr. Hadden goes a step farther, gives a number of cases of subacute and chronic placed the patients upon a diet of strictly anim foods, together with such vegetables as are destit saccharine properties. The resulting relief from of urates from the urine, and of the deposits fro surprising, and in one case, after improvement wa the renewal of starchy and saccharine diet brought tions.

The author gives remarkable testimony in this director of the zoological garden in Central Park, effect that herbivorous and granivorous animals subject to gouty deposits, the carnivora entirely es

In a second paper, published in the same journa page 458, the same observer records additional cas ing by the results his previously advanced views.

The use of certain classes of alcoholic beverages i writers upon the disease held to be a most potent pr gout, and it is generally accepted that fermented li the offending agents, but the influence of the differe class varies greatly. The least injurious are th France and Germany, as claret, hock, etc., but eve used, may after a time give rise to an attack of g wines of the Iberian peninsula, of Italy, and Mad Madeira, Marsala, as well as the Burgundy, of Fra general consent chargeable with great influence i many cases of gout occurring in the countries wh used largely.

The poorer classes, unable to procure wine a nevertheless in some countries, under certain c hygiene, are frequently victims of the disease, an that they are accustomed to the daily use of strong and often in enormous amount. Dr. William B ballasters of the Thames whose work is exhaustin great exposure to inclement weather; each man, h two to three gallons of porter daily, and he adds t ably frequent among them.

On the other hand, in countries where strong the stimulant in common use, as in Scotland, Irela etc., gout is a relatively rare disorder. Imperfec is strongly productive of the disease.

The influence of sex as a causal factor in the pre may be limited almost entirely to the difference in of life in the two sexes, and although it is found tha who become victims to the disease the greater number do so only after the cessation of the menstrual activity, it would be unwise to attribute from this fact a protective or preventive agency to the catamenial flux; for after the change of life, women, as a rule, enjoy much more ease than before; still, many authors believe in the protective influence of the menses.

The relation between the age of the individual and the appearance of his first attack of gout is well shown by the statistics of Sir Charles Scudamore, in which, out of 515 cases of a primary attack of gout, one case occurred at the age of eight, twelve, fifteen, and sixteen, 5 at eighteen, 3 at nineteen. Between twenty and twenty-five years of age there were 57 cases; between twenty-five and thirty, 85; between thirty and thirty-five, 105; between thirty-five and forty, 64; between forty-five and fifty, 54; between fifty and fifty-five, 26; between fifty-five and sixty, 12; between sixty and sixty-five, 8; and 2 cases were observed at the age of sixty-six. An attack of gout before the age of puberty is rare.

From the statements given above it will be seen that the greatest danger of a first invasion of gout is from the 25th to the 40th year, and that within this period the time between the 30th and 35th year is marked by a greater liability to attack.

Influence of lead-poisoning in creating a predisposition to gout has been long known; indeed, more than a century ago observations on this part of the subject had been published in England. More recently Garrod found that of gouty patients in hospital practice at least 25 per cent. had at some time been impregnated with lead, and for the most part they were either painters or plumbers. Other causes of the occurrence of gout in these cases could be excluded, but it was noticed that women engaged in white-lead factories were often sufferers from colic, yet were not afflicted with gout in an equal ratio with men, and the author just quoted thinks that the immunity may be due to the influence of sex.

The rarity of gout among painters in Scotland is ascribed to the fact that the workmen live near enough to their work to permit of their taking their meals at home, and that, consequently, they change their working-dress and wash faces and hands before eating; in London the reverse is the case, so that from the necessity of eating their breakfast and dinner at their working places their habits become less cleanly, resulting in lead impregnation.

Further investigation upon cases of distinct lead-poisoning showed that of 9 who had never had gout, 7 had uric acid in excess in the blood. Two experiments were made in determining the effect of the ingestion of lead salts upon the excretion of uric acid by the kidneys. Acetate of lead was given three or four times a day in doses of several grains. In both cases under the influence of lead the amount of uric acid excreted

diminished by about one-half, and it was noticed
nomenon that after the lead had been given for a d
arrest of the excretion of uric acid followed, and
kidneys became more or less intermittent. Addit
by the same writer are to the effect that the gout
thesis or by acquirement, are extremely susceptibl
lead.

Racial influence as a factor in the production of
seems to be without value, and the relation betwee
disease is practically *nil.* The effect of season as
termining influence is admitted; in the larger num
appears in the spring, and if the unwelcome guest
visitor for a few years, his calls are made at the sa
his absences are less prolonged, and a semi-yearly
autumn, and after a time he returns oftener and m

Pathology.—However interesting to us may b
old humoralists regarding the essential nature of g
nothing from them, since their opinions were base
speculation, and when they neared the truth they di

Cullen strongly combated the idea that the disea
a *materies morbi* in the circulation, but it was reserv
Forbes, in 1793, to give forth the belief that the dis
with the presence of lithic (uric) acid in the blo
Wallaston discovered the actual composition of go

More modern writers have followed up the clews
decessors, until now it is universally conceded that
consists essentially in the presence of urate of soda
possibly in the fluid permeating the tissues. Not
sensus of opinion upon the point just given, there
ences of belief as to the presence or absence of certa
either abnormal or, if normal, in excessive amount
fluid.

To Dr. Garrod belongs the great credit of provi
uric acid in excess in the blood, and of formulati
which is very generally accepted at this time.

As has been already stated, Forbes maintained t
acid in the blood to be the cause of gout, but he w
the acid. Dr. Garrod did discover the acid in that
in the free state, but in combination with soda as a b
and he devised a simple method by which the ac
when in excess in the blood. His theory of gout
however, with the mere statement of the existence
that fluid, but attempts to account for its abnorma
to give a reason for the local phenomena seen i
disease.

He formulates his theory in several propositions which may be summed up as follows: The normal amount of uric acid in the blood may be augmented either by increased production or by lessened elimination; in gout the kidneys are always implicated, functionally at first, and structurally in the chronic stages; the acid may exist in the circulating fluid, for a time at least, without the development of inflammatory symptoms; true gouty inflammation is always accompanied by a deposition of urate of soda in the inflamed part; the deposit is crystalline and interstitial, and may be looked upon as the cause, and not the effect, of the gouty inflammation; the local inflammation in gout tends to the destruction of urate of soda in the blood of the inflamed part, and hence of the system generally.

Dr. Bence Jones considers that the gouty diathesis consists in an excess of urate of soda not only in the serum of the blood, but also in the fluid that diffuses from it into all the vascular and non-vascular textures of the body. "An attack of gout is a chemical process set up in the parts where the urates are most able or liable to accumulate. The urate of soda bears the same relation to gout that sugar does to diabetes, ... and the want of oxidation of the urates and their consequent accumulation in the texture and blood is the cause of the gouty diathesis."

Other writers there are who hold that while uric acid is undoubtedly present in excess in the blood, yet it is not the only *materies morbi.* Gairdner thinks that from an antecedent venous plethora of the chylopoetic organs the blood becomes loaded with urea, urates, and, probably, biliary matters. He further complicates his hypothesis with a heart overburdened with the work of forcing the arterial current through already engorged organs—in fact, he lays more stress upon the mechanical view of the case than upon a physiological or chemical one.

Some observers have claimed that phosphoric acid is retained within the system in gout, and Garrod finds that oxalic acid frequently occurs in the blood of gouty subjects.

As to the causation of the uric acid in the blood in this disease, scarcely two authors are agreed. Lessened elimination will account for a part, but the larger portion seems due to increased production within the economy. Here increased production may mean lessened transformation of the acid into urea by oxidation, but there is reason to believe that a considerable part of the urea excreted never passed through the uric acid stage.

Garrod maintains that to "a loss of power, either temporary or permanent, in the uric-acid-excreting function of the kidney is due in part, at least, this condition;" but he also adds that "any undue formation of uric acid would favor the occurrence of the disease, hence the influence of high living, wine, porter, want of exercise," etc.

Senator combats this view with the statement that the kidneys are seldom found to be diseased at the time of the first he is further of the opinion that " the increased forı in gluttonous persons" is due to chronic congesti over-activity of the spleen.

A number of writers have maintained that the li whose derangement is to be charged not only any composition of the blood in gout, but also, second affections of the kidney in that disorder. The lates positive of these authors is Dr. Peter Hood, of Engl

The presence of an increased amount of uric aci ing conceded, it does not, however, follow that an a necessarily occur, but most authors agree that suc indigestion after a hearty meal, suppression of the c function, mental shock, etc., will determine the ons and this result is explained variously as being du *marked increase* of the uric acid in the blood, by t the renal excreting power, diminished alkalinity of

The explanation of the selective faculty, so to sa soda for cartilaginous and tendinous structures it is to make satisfactorily. The reasons assigned by good as any, *i. e.*, the slight vascularity of these tiss a diminished alkalinity of their fluids; in the form tion readily occurs, in the latter a precipitation of

To the question why the toe-joint is so often the posit, the answer has been repeatedly given that thi the most dependent portion of the body, and henc circulation occurs there with consequent easy effu that this joint, having to bear the weight of the bo gression, is not only subject to excessive strain, causes of injury.

Recently ingenious reasoning has been offered to that gout is a tropho-neurosis, having its centre in presumably near the point in the floor of the four irritation of which glycosuria is produced. Clini of some kind between gout and diabetes mellitus since authors report an alternation of the two disea and in others the apparent substitution of the gly the gouty one; in diabetes the enormous increase of by the kidneys probably suffices to dissolve any ex

As will be shown when speaking of the morbid a ease, when once a deposit is made in a joint, it rema from this that a joint, having received a full quantu no longer serve as a place for further deposition; are attacked in subsequent invasions. Moreover, lieves, as the gouty state intensifies the quantity o the blood is increased "and requires more surfaces upon which to deposit itself."

The local inflammation in gout is considered by the same authority to be the consequence, and not the cause, of the deposit of urate, and in support of this view he points to the presence of uratic nodules upon the cartilaginous structure of the aural helix without any previous inflammatory symptoms having been observed by the patient.

The function of the inflammation is, in his opinion, essentially curative in so far that in the blood of the inflamed part the uric acid is thereby destroyed. He states that while uric acid can be readily detected in the blood of a gouty patient or in the serum from a blister applied to a non-inflamed part, serum obtained by blistering the affected part contains no uric acid. In further proof he offers the fact of the feeble vascularity of the tissues selected as receptacles of the deposit as evidence in the same direction.

Dr. Bence Jones gives a somewhat similar explanation of the inflammation in gout, but he holds that the action is a general one of increased oxidation, in which the urates are destroyed as such and removed from the invaded joint.

Morbid Anatomy.—When examined post-mortem, the affected joints present appearances which vary according to the duration of the gouty condition and the number or severity of the attacks of the acute disorder. In severe old cases in which the occurrence of a gouty paroxysm has been often repeated, the joint has been observed to be imbedded in a mass of hardened urate, having the appearance of plaster-of-Paris, at times tinted yellow or more rarely pinkish. Of course, in such cases anchylosis was a consequence. In others the articular cartilages have been found to be coated with the chalky material, and ligaments, bursæ, tendons in the immediate neighborhood, as well as periosteum, have shown similar deposits. The bony substance itself is rarely found to be infiltrated with the deposited matter unless when in direct continuity with cartilage containing it. It is believed that the deposit is first made in the cartilages, and Dr. W. Budd has shown that it takes place in the centre, that is, as far away as possible from a fringe of bloodvessels which, at least in the larger joints, is present at the circumference of the cartilage. In subjects in whom the disease had appeared in only a slight degree the invaded joint exhibited, either upon the cartilages or other parts of the articulation, specks or streaks at times so small as to be seen only upon close examination. In such cases, by soaking the affected structures in warm water, the deposited material was dissolved, leaving the surface without any alteration. To Dr. Garrod this is proof of the interstitial quality of the deposit.

The synovial fluid of a gouty joint has at times been found to be thickened, more opaque than normal, and to contain a number of minute white specks which, upon examination microscopically and chemically, were proved to be aggregations of acicular crystals of sodium urate.

Similar deposits have been observed in the kidney. On section, Garrod found—and his statements were subsequently verified by Charcot—white streaks in the pyramids and following the lines of the straight tubes of the pyramidal portion of the kidney. Upon microscopic examination this appearance was resolved into crystalline deposition in the intertubular substance and amorphous aggregations within the tubes themselves.

Deposits of urate of soda have been observed on the sclera during a gouty inflammation of that tissue, and the deposits said to have been observed in the bronchi, etc., may be regarded as vagaries of the disease.

Phosphate and carbonate of calcium are not unfrequently associated with sodium urate in gouty concretions, and, according to Senator, compounds of uric acid with calcium, magnesium, and ammonium have been detected in the deposits.

The frequency with which structural changes are found, post-mortem, in the kidney in cases of advanced gout, is strongly corroborative of the views put forth by Garrod as to the lessened eliminating power of this viscus. In such cases the organ has been found contracted to one-half or even one-third its normal size; it appears shrivelled; its surface is rough and granular; its capsule thickened, opaque, and adherent, and, upon section, the cortical portion has dwindled until, in some cases, it has almost disappeared.

The urine in an acute attack of gout is rather scanty, high-colored, of increased specific gravity, and somewhat irritating, so that, at the height of the gouty paroxysm, its passage gives rise to a not inconsiderable scalding. Upon cooling, the urine deposits a copious sediment of a pink or of a brick-red color. This precipitate was formerly considered to be due to urates in excess, but as a matter of fact the proportion of the uric acid in the urine of acute gout is decreased, as has been already stated. The acidity of the fluid is, however, augmented by the fevered condition of the patient, and hence the whole of the uric acid present is thrown down. The color of the precipitate is due to the affinity which both uric acid and the urates have for the coloring matters of the urine.

In chronic gout the urine is paler in tint, is less concentrated, but shows a constantly decreased amount of uric acid, varying, however, from 75 or 80 per cent. of the normal average—an appreciable diminution—to an amount too small to be accurately determined.

Calcium oxalate is often found in the urine of gouty subjects, but holds no important relation to any theory of gout.

Albumin is frequently present in the renal secretion of gouty subjects, although not often during an acute attack, and then usually disappearing after recovery; but in chronic gout it has been estimated to be present in the urine in about 50 per cent. of the cases. It is generally found in small but variable proportions.

An increase of the amount of phosphoric acid in the urine during an acute gout has been observed.

In addition to the increase of uric acid, the only other notable change in the blood as yet determined during a fit of gout is an augmentation of the proportion of fibrin, an accompaniment of the inflammatory condition.

Symptomatology.—While there are no recognized prodromata to an acute attack of gout, it generally happens that the fit is preceded by some alteration in the general well-being of the subject, most often by some form of indigestion either referable directly to the stomach, liver, or other abdominal viscus; or, less frequently, there is noticed nervous depression, increased sense of fatigue, etc. These warnings may be, however, so slight as to elude the patient's notice until the attack is well under way. This has been repeatedly observed by Garrod in the first seizure of the disease. At times its onset is preceded by an exceptionally buoyant feeling, both physically and mentally. Any physical disorder to which the patient is subject is apt to be increased so that the invasion of gout may be preceded by some alteration of the heart's rhythm or force, or by an irritable state of the bladder, by hæmorrhoids, or itching of the skin.

The attack begins usually at night, during sleep, and has been observed to occur oftenest between the hours of one and three in the morning, when the patient is suddenly awakened by a more or less severe pain in, most often, the ball of the great toe. There is often present a slight degree of rigor. The pain grows in intensity, becomes more crushing in character, and a burning and throbbing sensation is also felt. The affected part becomes hot to the touch, swelled; its skin reddened, shining, and tense; the veins on the surface are distended, and the joint extremely tender, so that the weight of the bed-covering cannot be borne. The evidences of a feverish state are distinct in the hot skin, rapid pulse, and restlessness.

In many cases, after the lapse of a few hours,—it may be five or six,—considerable abatement of the pain takes place, the skin is bedewed by moisture, and the sufferer may even sleep. An exacerbation of pain and of the febrile disturbance takes place towards the following evening, and the patient passes a night of martyrdom, but in very severe cases there may be no remission of the symptoms during the day.

The events of the first day are repeated on the next, and so on as long as the attack lasts, which may be from three or four days to a week or two, or even longer.

With the fever, and depending in some measure upon its height, there is loss of appetite, thirst, generally constipation, scanty, high-colored, hot, or irritating urine. The tongue is foul or gives evidence of gastric irritation. The stools are often clay-colored and offensive from the absence of bile, and the urine, on cooling, throws down a reddish or pink deposit of urates.

A diminution of the tension of the skin covering the affected joint is a sign of the lessening of the disease; thus pitting on pressure is a valuable indication when first observed. The swelling of the joint now decreases, the engorged bloodvessels of the surface shrink and disappear, the redness of the skin is replaced by a more normal tint, pain gradually ceases, and itching of the skin and subsequent desquamation occur; some swelling, however, remains for a time, together with a weakness of the joint on using it.

The foregoing description applies to acute cases with a high degree of inflammation, in short, cases of sthenic gout. There are cases in which, from poverty of blood and low nervous tone, the attack is not accompanied by inflammatory symptoms, or, if present, these are relatively slight. Such are the cases of asthenic, or, as it is commonly called, poor man's gout. Here, owing to the less degree of inflammation, the pain in the affected joint is not nearly so severe as in the sthenic form, and the swelling is in a greater or less degree œdematous, even in the beginning, while redness and heat may be scarcely observable. In consequence of the feebleness of the vital processes in such cases, the chances of restoration of the joint to its normal integrity are much lessened.

After recovery from a first seizure a long time may elapse before another fit comes on. This period of exemption may last for years, and, indeed, by exceptionally good fortune, another recurrence may not take place at all. Often, however, the enemy returns in a year and at the same season as at first.

After a number of annual visits the disorder returns at shorter intervals, until its absence may be only for four or three months, or even less.

With the increasing frequency of its return the disease selects new points of attack, so that it might almost be laid down as the law o succession in gout that after the foot, the ankles, the knees, the hands and the elbows are affected in regular order.

For some time—it may be for years—successive fits of gout are bu duplicatures of the initial invasion, but as they return more frequently it is observed that they are not quite so intense, are somewhat mor prolonged, and that their disappearance is less rapid than at first—i fact, that the condition of chronic gout is being established until, a last, the patient's blood is never free from the *materies morbi*, and he i constantly menaced by the impending paroxysm, which only need for its development some trifling cause, as an error in diet, a slight chill, or some mental emotion of a depressing character.

The enormous proportional frequency with which the great toe is selected as the initial point of attack is shown by Garrod's estimate. He believes that not more than 5 per cent. of all cases have other joints implicated to the exclusion of the great toe. And in Sir Charles Scudamore's list of 516 cases, it is found that in 314 the great toe of one foot only was the site of the local manifestation. In 27 the great toes simultaneously, and in 32 the great toe together with some other part, were chosen. The ankles were involved singly in 36 cases, and together in 11. One knee only in 11, and both knees in but 1 case The instep of one foot was the selected point in 25, and in both feet in only 6 cases, and both ankle and instep in the same foot were attacked in 4. In 10 cases the outer side of one foot was the *locus morbi*, and the tendo Achillis in 4. In the same list the back of the hand and the wrist each show 4 cases, while the elbow does not appear at all as the sole objective point of seizure.

From the investigations made in the dead-house, as was shown in the previous pages, there is evidence enough to support Dr. Garrod's proposition that gouty inflammation is invariably attended with the deposition of urate of soda, and that such deposit is permanent; but such data give us no clew to the number or severity of attacks of gout required to produce external signs of such deposition. It may be broadly stated that a succession of gouty seizures in one joint can hardly fail to produce deformity of the part, with a greater or less degree of anchylosis; whether the deposited urate will become recognizable upon examination of the joint depends in great measure upon the site of the first deposit below the surface.

When recently formed, deposit is obtained by puncturing the part. It appears as a milky or creamy mixture; when examined microscopically, it is found to consist of a transparent fluid in which are needle-shaped crystals in great numbers; these react to the murexide test for uric acid.

Dr. Garrod is of the opinion that the deposit, when first exuded from the bloodvessels of the part, is a limpid fluid in which the urate of soda is held in solution, and from which the salt rapidly crystallizes out. As the watery portions of the mixture are absorbed, the consistency of the mass increases until finally it becomes quite hard.

These hardened masses are variously termed gouty concretions, tophi, or simply (and erroneously) chalk-stones; and notwithstanding the fact that they are foreign bodies, their presence in the joint or in neighboring structures does not, as a rule, give rise to suppuration. As accretions are made to the original deposit, the increase in size seems to be towards the surface, probably because in that direction is the line of least resistance, and it happens, at times, that the skin yields and finally breaks, giving exit to white, solid particles in the case of an old deposit, or of a milky liquid in a recent one. When fresh additions have been made to an old and hardened mass, what is known as a gouty abscess is formed when opened by the giving way of the skin; such an abscess may continue to discharge for a long time, perhaps for years, and except when in bursæ, they are extremely difficult to heal. In long-standing cases, with depraved nutrition, suppuration of the surrounding tissues may occur and discharge through the already existing outlet.

Varieties.—Different classifications have been made from time to time of the various modes in which the gouty state manifests itself, and in most of these the term *regular* is used to indicate the peculiar phenomena of gouty inflammation of the joints, whether the state be acute or chronic. Under the designations *atonic*, *retrocedent*, *misplaced*, *disguised*, *lurking*, *complicated*, and *abarticular*, different authors have included manifestations of the disease in which the articular structures are not involved, or, if so, with the accompaniment of inflammatory processes or other disturbance in other organs or tissues. Garrod places all these forms under the heading *irregular gout*.

Retrocedent gout includes all the conditions in which the gouty phenomena disappear suddenly from an affected joint with the more or less immediate occurrence of serious trouble in some internal organ, generally the stomach, intestines, heart, or brain. In these cases there is no evidence that an actual transference of a *materies morbi* has been made, but the relation between the sudden subsidence of articular inflammation and the equally sudden appearance of grave visceral disorder is a remarkable one. Many cases are recorded in which the influence of cold, either accidentally or designedly, applied to an actively gouty joint, has resulted in relief of the articular suffering, but with the production of most dangerous internal affections, whose outcome in some instances was death. When the stomach is affected as a result of the recession of gout from a joint, the symptoms are in many cases alarming. Severe gastric pain, spasmodic in character, with vomiting, accompanied with intense præcordial anxiety and oppression, are the most evident, and relief of the gastric trouble by treatment brings with it a renewal of the articular pains. In some fatal cases the extreme tenderness over the stomach and a general feverish state demonstrates the presence of a real inflammation of the viscus.

When the bowels are involved by retrocedence, the symptoms are those of spasm or inflammation, and vary accordingly.

If the heart be seized, its rhythm is greatly altered; there is great dyspnœa, with anxiety, together with a sense of constriction of the chest; the pulse is feeble, thready, and often intermits. The disorder here is believed to be in most cases spasmodic, and fatal results have been attributed to the previous existence of some cardiac lesion.

Retrocedent gout, affecting the brain, generally shows itself by symptoms of apoplexy, and in fatal cases the effusion within the brain has been found to be serous in character. Cases of mania from repressed gout have occurred.

The influence of cold upon a gouty joint is not the only cause of the conditions just given; seizures of similar kind have occurred from imprudent indulgence in wine, or from strong mental emotion, or from exposure to inclement weather, etc.

Cases of internal disorders of more or less gravity, continuing in spite of all treatment until a fit of articular gout occurs, when immediate relief of the visceral trouble ensues, receive the designation *latent gout.*

But besides the conditions just given in which serious internal diseased states are preceded by a suppression of gouty phenomena in a joint, or, without such recession, are relieved by the occurrence of a typical gouty seizure, there are others in which the gouty diathesis plays a most important rôle. Such instances of *vicarious gout*, as it has been named, have been observed in the stomach, heart, lungs, skin, eye, liver, bladder, kidney, and other organs. In some of these, notably the kidney, deposits of urate have been noticed, and in gouty inflammation of the eye-tunics similar deposits have been seen; in the vast majority of cases of latent gout such deposition is not observed, but the presence of the gouty diathesis, either by heredity or acquirement, and the results of treatment based on this view, have been the chief means of placing the existence of such cases beyond doubt. The only absolute method of determining the presence of the gouty state is the discovery of uric acid in excess in the blood.

The precipitation of uric acid or urates in some portion of the urinary tract from a urine surcharged with the acid or its combinations is what might be expected from a knowledge of the uric acid diathesis, and the frequency with which gouty patients void gravel with the urine, or suffer from calculi in the bladder or pelvis of the kidney, has long been known. Also, calcium oxalate is found not uncommonly to alternate with uric acid or the urates in the calculi of the gouty or to exist in the urine. Further consideration of these points is not needed in this place.

Diagnosis.—The diagnosis of acute regular gout is without difficulty; even in a first attack the time of seizure, the part usually selected, the local phenomena described in a previous section, and often the mode of life as well as the history of the patient, will enable us to decide the question without hesitation.

But in cases less regular in the manner of seizure or place of attack, or without a gouty history of either habits or descent, or possessing other misleading peculiarities, we may reserve our diagnosis until Garrod's thread-test shall decide for us.

This test, as has been stated, may be the only means of diagnosticating, in doubtful cases at least, the presence or absence of gout; it is based upon the researches of Dr. Garrod, who showed that the amount of uric acid present normally in the blood is too minute to be demonstrated by the thread-experiment.

The test may be applied to the blood drawn for this purpose, or to serum obtained from a blister; the latter is unsatisfactory in case the result of the test proves negative.

The uric acid thread-experiment is performed as follows: one or two fluid drachms of the serum of the blood are placed in a flat glass dish about three inches in diameter and one-third of an inch in depth; then for every fluid drachm of serum six minims of the strong acetic acid of the Pharmacopœia are added. After mixing the fluids by means of a glass rod, one or two ultimate fibres, about an inch long, from unwashed huckaback or other linen fabric, are to be depressed within the mixture; the glass is to be covered with filter paper to exclude dust, and is to be put aside in a cool place until the serum is quite "set" and almost dry, the time required varying from 36 to 60 hours according to the warmth and dryness of the atmosphere. The action of the acetic acid is to liberate from the sodium urate, if present, its uric acid, and the latter crystallizes upon the fibre in rhombs which may be readily observed under the microscope with a power of 50 or 60 linear.

Freshly drawn blood should be used, since it has been found that blood known to contain uric acid has, after some time, refused to respond to tests for that acid, owing to the breaking-up of the latter into oxalic acid and some other bodies.

Rheumatism has been observed to attack those who have had previous gouty paroxysms or, indeed, were actual sufferers from chronic gout. In such cases the tendency to consider the disease gout will be restrained by the recognition of the less sudden onset of the disorder, the absence of remissions, the marked febrile disturbance as well as the local characteristics of acute rheumatism already given in describing that disease.

Rheumatoid arthritis may be mistaken for gout, and at times the distinction may depend upon the results of the thread-test, but a further consideration of the points of difference between the two will appear in the following section.

Prognosis.—As far as this relates to the immediate outcome of the paroxysm it is uniformly favorable, but it is a well-known fact that gout is a serious disease, considering its ultimate influence upon the duration and usefulness of life. Undoubtedly there are cases recorded of persons having but one attack of gout, and who died at an advanced age, and of others in whom the disease recurred regularly, and after some years began to lessen in violence until it at last disappeared.

Such fortunate results are possible under a happy combination of medical and hygienic control of the patient's mode of life in cases where the first attack did not take place before middle life or when, at that period, the interval between the fits had not decreased.

When gout becomes chronic, the blood is almost constantly in an impure state, and the kidneys are very commonly diseased. In such conditions the intercurrent diseases to which every one is liable, or casualties or exhausting influences, etc., which in ordinary health would not be considered grave, may be of the most serious import.

In general it may be stated that the earlier the age at which the disease appears, the more unfavorable must be the prognosis, and that similarly, as hereditary gout is less amenable to treatment of any kind than the acquired disease, cases of the former are to be viewed with apprehension in considering the probable duration of life.

As the kidneys lose their power of excreting uric acid, we find the proportion of that constituent in the urine progressively lessening, until it finally disappears; at the same time the color of the fluid becomes paler, its specific gravity decreases, its quantity augments, and the presence of a small and variable amount of albumin is hardly needed to assure us that we have to deal with gouty kidneys and that our prognosis can only be unfavorable.

Dr. Garrod views as inauspicious the appearance of gouty deposits on the surface of the body, even if only on the helix of the ear.

Treatment.—*Preventive.*—As the gouty state depends upon the presence of uric acid in excess in the blood, preventive treatment must consist in removing the cause of such excess, if possible. Unfortunately, as has been already stated, the ultimate cause of the production of the uric acid has not been determined. A number of observers have recorded their belief that to the liver we must look for a solution of this problem, and Anthony White, Hood, and others claim to have produced the most gratifying results in gout by unloading the liver. Such considerations may be of service to us in pointing out the direction which preventive treatment should take. That the influence of alcoholic fluids, and especially fermented fluids, such as wines, porter, ale, etc., is to cause functional disturbance of the liver is well known, and as the latter class of beverages is accepted as the most potent factor in the production of the gouty state the indication is clear for the avoidance of such drinks.

As to the kind of food to be used or avoided we are much less sure; most writers hold to the opinion that albuminous food is noxious to the gouty, but the investigations of Dr. Hadden lead to an opposite conclusion, at least in chronic and subacute gout. Probably safety will be found by keeping well within the extremes, and a judicious combination of both albuminous and starchy or saccharine food will be nearly the best in general.

The view which sees in the accumulation of uric acid in the blood only defective oxidation is most likely founded in part upon truth, and Hood, in his interesting work upon gout, gives several cases in each of which, after a fit had begun, the sufferer took a long and rapid walk with consequent relief. The indication here then is to keep-up the oxidation within the tissues by a fair amount of vigorous exercise daily.

A fit of indigestion has often been the immediate precursor of a gouty paroxysm, and any tendency to weak or faulty action of the stomach should not be suffered to go on without an effort to remove it.

As suppression of the cutaneous exhalations has been assigned a place among the provoking causes of acute gout, the activity of the skin should be insured by bathing at frequent intervals and by sufficiently protective clothing; finally the tendency to violent or depressing emotions should be overcome, as it generally can be, by force of will.

During a fit of the gout, if it be at all severe, the patient should be strictly confined to bed with the affected joint in as easy a position as is attainable. If the local redness and tumefaction be more than slight, the part may be enveloped in cotton-wool, or if the inflammation be of high grade some alleviation of suffering will be obtained by adding an outside covering of oiled silk or other air-tight material; but the feelings of the patient had best be consulted ordinarily.

Of the most importance is a regulation of the diet; without this no treatment will prove efficacious. Absence from such articles of food and drink as are known to excite or produce the gouty state should be imperative, while the use of solid food, especially of the albuminous kind, is to be prohibited as long as any febrile disturbance lasts. The diet then should be of light, semi-fluid, and readily digestible articles, with weak tea, lemonade, or water as a beverage.

When the local inflammation subsides and the feverish conditions disappear, the diet list may be increased by the cautious addition of beef-tea at first, followed gradually by the lighter meats, such as chicken, fish, etc., until, at last, ordinary food may be indulged in; but the rule should be to avoid any excess of food beyond the needs of the system. If the attack be prolonged, it is likely that a condition of weakness or tenderness of the part may remain for some time; hence the need of caution in using the joint.

The deposition of urate of soda within or about an articulation frequently gives rise to rigidity as well as deformity. Usually it is best not to interfere by giving exit to the deposit through an incision, for if the amount of deposited urate be considerable, or to any degree in the solid state, the wound does not close readily, and serious results may follow; among such consequences erysipelas of a low grade has been observed. The tendency of these deposits is to increase in the direction of the surface, and not unfrequently the skin ruptures with the production of a so-called gouty abscess. Often such abscesses are slow to heal; a simple water-dressing, with the addition of Calendula, forms, perhaps, the best local treatment.

When œdema of the part remains after a gouty attack, it may be treated, if depending simply on local debility, by pressure and massage, and for the former an elastic stocking is especially valuable. When the œdema is due to renal or cardiac complication, internal symptomatic treatment must be relied on.

Gout of the irregular varieties must be treated according to the symptoms of the case, but as it generally happens that this form of gout is the consequence of a suppression of an articular manifestation of the disease, it is of the utmost importance to redirect the morbid process to its first location. To this end the use of heat, as by hot-water bottles or even an application of mustard-paste to the extremities, will often suffice.

Therapeutics.—Ammonium phosphoricum.—To remove the deposit in the joints.

Apis.—Inflamed joint of great toe; it feels distended and stiff. Much relief from cold applications.

Arnica.—The affected joint is swollen and painful, hard and shining. The patient fears touching the inflamed part, and indeed the whole body is thus sensitive; the bed feels too hard. Aggravation at night.

Benzoic acid.—Inflamed joint with great pain when the characteristic deep-colored urine of intensely urinous odor and high specific gravity is secreted. Gouty diathesis. In recurrent attacks.

Berberis.—Stitching or tearing pains in the ball of the great toe. Especially in patients who have had urinary, renal, or hepatic disorders. Urine is usually cloudy, and deposits a grayish sediment.

Bryonia.—The inflamed joint is swollen, tense; redness slight. Nausea on raising the head from the pillow. Tongue coated white, more down its centre. Mental irritability.

China.—Tearing pains in the great toe-joint, with some swelling and redness. Aggravation at the slightest touch or motion, especially in the evening. Great weakness. Canine hunger, alternating with excessive appetite; flatulence. Urine throws down a brick-dust sediment.

Colchicum.—The great toe-joint is swollen, dark-red, hot, and extremely painful; the foot is swollen and œdematous. The pain is excruciating, and sensory impressions are trying to the patient, especially in the evening. The odor of food produces nausea. The urine is scanty and dark. Marked prostration.

Eupatorium perfoliatum.—Toe-joint inflamed, swollen. Foot œdematous; aching pains all over, referred to the bones, as if they were broken. Urine profuse.

Ledum.—The toe-joint and surrounding parts are swollen and hot; the pains are tearing and grinding, sometimes shooting. The swelling may extend and appear œdematous. Marked aggravation from warmth; the least covering on the affected part cannot be borne. Urine not scanty, urination rather frequent. The site of previous deposit becomes very painful.

Lithium carbonicum.—Gouty symptoms of feet and hands. Uric acid pre- [illegible] from the urine.

[illegible]odium.—In chronic cases. Arthritic swelling especially of toes and [illegible]elling of dorsa of the feet. Nightly pains, ameliorated by warmth. Uric [illegible]sit in urine, with the characteristic gastric and hepatic symptoms of this

Nux vomica.—The patient is awakened at 3 or 4
the great toe. Especially valuable in persons whose mode of
eat plentifully and indulge in stimulants; constipated habit.

Plumbum.—When evidences of contracted kidney are
toms correspond with this remedy.

Sabina.—The great toe is hot, swollen, red, and extrem
tion at the least touch or on motion, and with some relief from
fever, worse in the evening. Heaviness in the affected limb;
tion to obtain some alleviation.

Sulphur.—The pains frequently disappear, and then
ness. When falling asleep, aroused by jerkings of the affecte
ing pain. Often indicated in cases dependent upon indulgen
table, with want of sufficient exercise. Blotches on the face;

Terebinthina.—With nephritic complication. Urin
pink sediment.

In addition the following may at times be indi
crudum, Calcarea carbonica, Graphites, Guaia
bichromicum, Kali hydriodicum, **Manganum**, **Na**
Rhododendron, **Rhus toxicodendron**, Staphisagri

For suppressed gout: Colchicum, Natrum phos
ium carbonicum, if to the heart; Antimonium
dium, if to the stomach.

Affections of the head and eyes depending up
or undeveloped gout: for headache, Bryonia, Colc
Nux vomica, Spigelia, Sulphur, Rhus toxicoden
tory troubles of the eyes, Bryonia, Rhus; for n
the eyes, Colocynth, Spigelia, Staphisagria; affect
or abdomen under the same conditions, Bryoni
dium, Arsenic, Colocynth, Nux vomica, Antimoni

RHEUMATOID ARTHRITIS.

BY J. T. O'CONNOR, M.D.

Synonyms.—Arthritis deformans, Polypana
gout, Nodosity of the joints.

Definition.—A disease characterized by art
and subsequent deformity, gradual in its onse
progress, without marked febrile symptoms, an
any abnormal state of the blood.

History.—This disease, although not descri
among the ancients, has undoubtedly existed
since bones showing evidences of its effects have
ruins of Pompeii; but it has only in recent years
from rheumatism and from gout, each of which
resembles.

Ætiology.—The influence of heredity as a
the disease is believed to be slight; Charcot is q

in 41 cases 11 in which there was a marked predisposition by inheritance.

The disease appears oftener in women than in men; this seems to be due to certain influences. It may occur at any age, since it has been observed in children of 3 or 4 years, and a first attack has happened after the 70th year. According to Garrod, its first invasion is oftener noticed before the 40th year.

Senator, however, divides the disease into three varieties. The peripheric form, "beginning in the smaller joints of the extremities, is much more common in women than in men, is almost entirely absent during childhood and youth, is more frequently found towards the 30th year, and becomes more common in women about the climacteric."

Another variety, according to this author, selects the larger joints by preference, and since it is found oftenest at a later period of life it is termed the "senile form." Occasionally this form is found to begin in middle life, but generally in persons prematurely aged, as is evidenced by the presence of senile changes, as atheromatous degeneration, etc. Moreover, this variety is more frequently seen in the male sex.

Especially favorable to the production of rheumatoid arthritis is debility and, more particularly, a feeble circulation. The influence of hæmorrhage in this direction is well-known, and a frequently occurring cause in women is menorrhagia. The drain upon the system of too prolonged lactation acts similarly, as do the exhausting effects of frequent parturition. The action of depressing emotions, such as grief, or the prolonged strain of constant anxiety, or of night-watching, causes a lowering of tone both in the circulatory and nervous systems, and so holds out an invitation to the disease.

Again, insufficient or innutritious food, especially to those overworked at closely confining occupations, tends in the same direction, and it will be seen that most, if not all, of these causes are oftener found to be the common conditions of existence among the poor. Senator finds that it is the peripheric variety of the disease which results from the causes just named, and that, while the senile form is not absent among the poor, it is found just as often among the well-to-do.

The use of fermented or malt liquors does not seem to have any bearing on the causation of the affection.

Traumatism is given by authors as an exciting cause of the disease, but, according to Senator, when the result of injury, the disorder is strictly monarticular, and limited to the injured joint.

The most powerful excitant of rheumatoid arthritis is exposure to cold and damp, and it may be stated here that acute rheumatism has been observed to pass by a gradual transition into this distinct disease.

Cases are on record in which fright seems to have been the only assignable cause.

Pathology.—The name by which this disease was till lately known would lead one to the belief that it is essentially the result of a combination of the pathological states found to exist in rheumatism and gout. But the absence of uric acid in the blood or tissues disproves any gouty condition, while dissection of a joint affected by the disease shows lesions entirely different from any produced in rheumatism.

So far, no known alteration in the blood has been observed, and in the absence of any *materies morbi* within the circulation we are inclined to seek an ultimate cause for the disorder in the nervous system. Indeed, the repeatedly observed fact of a feeble or weak circulation, with its attendant subjective coldness, is dependent rather upon lowered innervation than upon the state of the blood directly. Whether the disease is to be classed among the spinal arthropathies is a question as yet *sub judice*, for structural changes in the nerve-centres, even if proven to exist, may be consecutive to the peripheral manifestations.

Symptomatology.—During a condition of ill health from any of the causes already given and especially characterized by lowered vascular and nervous tone, exposure to cold and damp, or subjection to some depressing psychical condition, there appear pain and swelling of one or more joints, accompanied by some local tenderness. In the peripheral form of the disease the invasion is symmetrical and begins at the smaller joints, but in cases in which the extremities are not first involved this is not so readily observed.

In addition to the aching and tenderness of the affected articulation there is often present, especially when a larger joint is involved, pain, distinctly neuralgic in character, and defining, so to say, the course of a large nerve trunk and, at times, its ramifications.

The swelling, at first slight, soon increases, and the joint conveys upon palpation a distinct sense of fluctuation due to augmented secretion within; after a time this disappears from absorption.

Cases of acute rheumatoid arthritis have been described by writers; in these the local symptoms are of sufficiently high grade and are accompanied by such constitutional disturbance as to lead us to seek for the other phenomena of acute rheumatism. But the absence of the characteristic sweats of the latter and of its erratic changes in location, as well as of its tendency to peri- and endo-carditis, soon satisfy any doubts.

In the far greater number of cases such acute condition is not present, and often the attack disappears under very simple treatment.

After a time a recurrence of the disorder takes place, and very likely proves to be unamenable to treatment; some swelling and pain remain, and after a greater or less interval other joints are implicated. Stiffness of the articulations becomes a marked symptom, and soon enlargement of the articulating ends of the bones is observed, without redness of the overlying skin, without pain, and with little, if any, tenderness. Stiffness of the part is noticed and is especially observable on beginning to move the joint after a period of rest, and at the same time more or less crepitation in the articulation can be heard and felt on motion. The soft parts near the joint become absorbed, and atrophy of the muscles, to a greater or less degree, follows, so that by contrast the enlargement of the ends of the bones is visually magnified.

The disease progressing, the cartilages of the articulation undergo a special degeneration and absorption, and the tendons of muscles attached to the implicated bones become rigid and contracted, and at the same time often displaced by the increased osseous growth; this is remarked in the hands where the extensor and flexor tendons, instead of passing centrally along the long axis of the phalanges, are in relation with the lateral aspects of these bones. The displacement is generally to the ulnar side, and with the irregular contraction of tendons and dislocation of members of the articulation, due in part to the contractions and in part to loss of integrity of the affected joints, ensues a deformity difficult to describe. With the fingers in close apposition and each partly overlying the next, the first row of phalanges flexed perhaps at right angles to the carpus, and the second and third rows partly flexed, all the phalanges more or less dislocated and pointing to the ulnar side, and with greatly impaired mobility, it will be seen that inability to use the hand to any great extent must result. Fortunately, the thumb is often exempt from the contractures, and thus the patient is enabled to help himself in many ways. When, as may be the case, the first phalanges are strongly extended upon the carpus, with the second and third rows as strongly flexed, the thumb being in marked adduction, the resemblance of the deformed member to a bird's claw is very marked.

The knee and elbow joints, when attacked, show enlagement and deformity from the conditions already named; they are generally in a position of semi-flexion. When the hip-joint is the seat of the disease, external signs of the disorder are not so obvious, but the thigh is more or less flexed and at times adducted, or the reverse; if adducted, the foot is turned in; if abducted, it points outward.

If the vertebral articulations become involved, the fact is made known by the special immobility resulting. If the disease be in the cervical portion, inclination of the head or rotation cannot be performed, while, if in the dorsal or lumbar region, rigidity and, often, deformity of the affected portion may be noticed. The disease does

not invade articulations of the spinal column
clavicle, etc., unless in advanced cases.

The deformities just enumerated are not spe
rheumatoid arthritis, since they are found in ca
but further consideration of this point will be m
upon diagnosis.

It has been stated that the disease is progressi
rate of advance is often extremely slow. In some
arrested during long periods, perhaps of years,
resuming its onward march.

A special form of this disease, extremely chro
unattended with pain, is that described by Hebe
Digitorum nodi. It is characterized by the a
nodules upon the last phalanges of the fingers, an
there are present swelling, enlargement of the a
bones at the last joint, and some degree of anchyl
ties were formerly believed to be of gouty or
distinguished from gouty deposits which often
site.

Morbid Anatomy.—Since rheumatoid arth
stage without danger to life, observations upon th
of a diseased joint at this period have been few.
that a joint at this time presents simply the s
articular inflammation—chiefly vascularity of th
with marked increase of the synovial fluid. W
made some time after the effusion has become
brane is found thickened, and the articular carti
first minutely becoming brush-like from a splitti
low degeneration and absorption in spots, so that
partly uncovered. The process continuing, the w
may disappear, and the ends of the bones during
are brought in contact. Under such circumst
peculiar protective modification of the nutrition
surfaces of the bones takes place by which they a
appearance and hardness. This condition, term
at times exist in streaks lying in the direction
joint is used. When the bone beneath is sawed
to be more spongy than normal, and to contain o
of fatty degeneration. At times the ivory laye
cancellous structure is exposed, leaving the head
In some cases the capsule of the joint undergoes
and portions of new osseous or cartilaginous f
within the cavity, either as loose masses or as stal

By the loss of cartilage as well as of bone-subst
sions or sockets become much enlarged, and, as b

within the joint the ligaments have been overstretched, the readiness with which dislocation often occurs can be easily understood.

On the other hand, the direction of bony enlargement may be such as to encroach upon the cavity at its rim or in other ways to interfere with the use of the joint.

Diagnosis.—Rheumatoid arthritis, if acute, may be confounded with either acute gout or acute rheumatism. From the latter it may be differentiated by the absence of high constitutional disturbance and of the peculiar sweats, as well as by the non-existence of tendency to cardiac affection; from the former, by the fact that the great toe is not a special object of attack, by the absence of diurnal amelioration of the symptoms, and by the freedom from uric acid either in the blood or tissues.

The chronic form of the disease under discussion may be separated from chronic gout by the symmetrical mode of invasion, as shown in the history of the case, by the absence of uratic deposits, and by the negative results obtained on making the thread experiment. The deformity seen when similar parts are the subjects of the two disorders is often practically identical, but even here the crepitation heard and felt when the affected joint is put in motion, the atrophy of the soft parts in the neighborhood, and the antecedent history will greatly aid in clearing up any doubts.

In chronic rheumatism the tendency to any great deformity of the inflamed joint is relatively slight.

In gonorrhœal rheumatism the tendency to destructive changes in the involved part, as well as the extremely slow rate at which effused material within the joint is absorbed, may cause some uncertainty of opinion, but only until the existence of a recent gonorrhœa becomes known.

Prognosis.—Since rheumatoid arthritis is, to speak broadly, a vice of nutrition, limiting itself chiefly to the structures of the joints, and with no tendency to invade vital organs, it will be seen that a fatal ending, even in its advanced stages, is hardly to be expected as a direct result. But without proper treatment—and this includes absolute change of faulty modes of living as well as the use of fitly chosen medicine—the hope of bettering the patient's condition, or of even preventing further progress of the disorder, is, in general, a vain one.

Unexpected improvement in what were believed to be hopeless cases, of which instances are recorded, owed their betterment probably to some circumstance in treatment or to some change in hygienic surroundings of an unrecognized character rather than to a spontaneous cessation of disordered activity on the part of a centre whose perturbed impulses determined the destructive alterations found in this disease.

Treatment.—From what has been already given as to the causation of rheumatoid arthritis, it is evident that preventive treatment, as such, has no scope; for there are no means of telling whether a person living under the conditions described in the section on ætiology, will, or will not, be attacked by the disease.

As soon as the disorder has made its appearance, we are to do what should be done in any case living under improper conditions, that is, establish such hygienic improvements as will remove as many of the exciting and predisposing causes of the disease as possible. Hence, as a languid circulation and marked inability to bear cold are frequently among the antecedent conditions, the use of sufficiently protective clothing, and other defences against loss of heat, need only be alluded to and, when circumstances permit, the recumbent position during a portion of the day will be found beneficial. The exhibition of cod-liver oil, whether it be considered simply as a nutrient or as medicament, has been apparently of service.

Local treatment should be of the simplest kind. As long as symptoms of inflammation remain, the affected joint should be kept at rest, and warm applications, such as the sand-bath or vapor-bath, used for an hour or more at a time, and two or three times in the day, have been highly commended by Trousseau and others.

When the pain has subsided, moderate movement may be made, and if active motions result in pain, passive movement accompanied by massage may be resorted to; indeed, massage is of great value in any stage of the disease when it can be borne. Local inunction with cod-liver oil ought to be practised, at least twice a day during long periods of time, upon all the affected joints in which any motion is possible.

Althaus, Rockwell and Beard, and others, have found the application of "general faradization, central galvanization, and galvanization of the sympathetic" very useful in the treatment of this affection. The value of the objective symptoms of rheumatoid arthritis as helps in choosing remedies is extremely small, for it is not to be expected that provings should be continued sufficiently long or with sufficient intensity to produce in the joints anything like the deformity and disorganization found in the disease. Hence, the necessity so well understood by our school of prescribing for the patient in his entirety; moreover, in so doing, the aberrant function, whether in the nervous system or not, upon which the disease, as it appears at the periphery, depends, will be brought to a normal condition.

In homœopathic literature the record of cases of this disease is small, but there is reason to believe that of the cases of rheumatism with articular deformity therein to be found, a large proportion were of the disorder under discussion.

Guided by these views, the following remedies are believed to be frequently called for in the treatment of the affection; but it must be borne in mind that a disease so slow in its progress is not to be cured by hasty changes of remedies, and that, wherever possible, the remedies prescribed should be of those known to cause tissue changes, *i.e.* the anti-psorics.

Therapeutics.—**Ammonium phosphoricum.**—The joints of the fingers and hands and back are swollen, with emaciation, anorexia, sleeplessness, evening fever.

Benzoic acid.—Painful nodes in the joints. Characteristic urine, dark colored and of intensely urinous odor.

Calcarea carbonica.—Creaking in the joints as if they were dry. Chilliness and sensitiveness to cold; cold feet constantly.

Causticum.—Nodes on the joints with stiffness and swelling; contractions, weakness and lameness of the limbs. Pains aggravated by cold air. Better in the warmth, with aversion to being uncovered. Restlessness without relief from the motion.

Guaiacum.—Swellings of the joints, with contractions and pain on the least motion. Amelioration from warmth.

Ledum.—Nodosities in the small joints of the fingers, the knee joint and the joints of the feet, which are painful, and specially so from external heat; even the warmth of the bed cannot be borne.

Rhododendron.—Enlargements of the joints not due to gouty deposit. Digging, drawing pains often felt in the bones. Aggravation during rest, towards morning, and at the approach of a storm or during stormy weather.

Besides the foregoing remedies the following are worthy of special study: Dulcamara, Iodine, Lithium carbonicum, Lycopodium, Magnesia carbon. and muriaticum, Manganum, Natrum muriaticum and sulphuricum, Phosphorus, Silicea, Sulphur.

PROGRESSIVE MUSCULAR ATROPHY.

BY J. T. O'CONNOR, M.D.

Synonyms.—Wasting palsy; Paralysis atrophica; Amyotrophic paralysis.

Definition.—A disease characterized by atrophy of voluntary muscles, with consequent paresis of the affected parts.

History.—Cases of what we now know to be the disease under consideration had been recorded during the first half of this century, by different writers, as "creeping palsy," "partial palsy," or "anomalous hemiplegia," but the efforts of Duchenne, Aran, and Cruveilhier, from 1849 to 1853, resulted in separating the affection from other forms, and in determining its place in medical nomenclature.

Ætiology.—Among the predisposing causes of progressive muscular atrophy, a number of writers have insisted upon the existence of a special diathesis, and from considerations to be presented hereafter, it will be seen that there is much in favor of the hypothesis.

A high value is given to heredity as a causal factor by several observers, but the percentage of cases of the disease in which this influence has been clearly detected has not been determined.

Sex holds an important place among the ætiological factors of progressive muscular atrophy, since it has been found that by far the greater number of cases of the disease occur among males. Indeed, it may be stated that the transmitted tendency appears oftener in the male line.

The age at which the disease most frequently appears may be given broadly as that of middle life, but it has occurred in infancy and also beyond the 50th year. Roberts gives the mean age of eighty-eight cases as the 30th year—the youngest being two years, the oldest sixty-nine.

The exciting causes of progressive muscular atrophy include excessive muscular action, as in many trades, exposure to moist cold, certain traumatic influences, the effects of exhausting diseases, such as typhoid fever, measles, etc., or of venereal excesses and, possibly, syphilis.

It will be seen in relating the symptoms of the affection, that certain groups of muscles are first attacked, and these are oftenest of the upper right extremity, the use of which is excessive and prolonged among smiths, saddlers, leather-workers, miners, masons, and others; and Roberts has observed that among women of the working class the liability to the disorder is apparently not much less than among men under like conditions.

Even in children the same rule holds good, since, according to Eulenburg, their playing in a sitting and bent posture calls for great use of the lumbar muscles, and it is in these that the primary invasion of this disease is frequently seen among children. Hammond reports two cases in ballet dancers, in each of which both gastrocnemii gave the first evidence of the atrophy, and one case of a bricklayer whose work required him to stand chiefly on one leg, in which the over-used member was the first attacked. Many similar instances might be quoted, but the exceptions to the apparent rule are numerous. (Roberts.)

The proportion of cases directly traceable to muscular exertion can not be accurately estimated, but they are relatively few; of 52 cases reported by Hammond, 8 only could be attributed to this cause, while exposure to cold and dampness produced 13. Roberts believes that the two causes too often coöperate.

Exposure to cold and wet is, according to most writers upon the disease, directly chargeable with its production, but the numerical proportion of the cases so caused has as yet not been closely calculated; Hammond's statistics already given throw some light on this portion of the subject.

A number of cases of the affection have occurred apparently as the consequence of traumatism; out of Hammond's 23 cases in which a determining antecedent factor could be assigned, two are said by him to be the result of injuries to the spine, presumably concussive; and Roberts, quoting from other writers, gives two cases in which the disease was attributed to a fall on the back, the atrophy in each case being slow to appear, and in one of them not being observed until six years had elapsed. He also quotes another case in which a gentleman, aged 54 years, jumped and came down heavily on his heels, and then fell backwards on his head; after some days he had recovered but it was soon noticed that from being extremely fond of athletic sports he became averse to all except grouse-shooting; yet it was not until five years after the accident that muscular atrophy was first noticed. Eulenburg gives two cases in which the symptoms of progressive atrophy followed a crushing of the hand.

Pathology and Morbid Anatomy.—The earlier writers upon the disease held that it was essentially a myopathia in which the affected muscle first underwent fatty degeneration, and that the result of such metamorphosis subsequently disappeared by absorption. Such view is, as long as inquiry is confined solely to investigation of the atrophied parts, apparently well supported, since post-mortem examination shows the affected muscle, if it have not entirely vanished, to be paler in color, varying from pale pink to yellowish, the latter being due to the more complete disappearance of the sarcous element and the substitution of granular and fatty material. The striations in advanced stages of the disease-process are found to have faded away, and at times the sarcolemma is the last of the muscular elements to disappear, while all that remains to mark the *locus* of a former muscle may be a slender mass of perimysium connected with the points of origin and insertion.

As will be seen in the symptomatology of the disease, a portion only of a muscle may undergo atrophy, and the disorder in its progress frequently overleaps whole groups of muscles; these and other considerations led to the belief that in the nervous system, either peripheral or central, the origin of the atrophy was to be found.

Cruveilhier found upon examination of the spinal cord of Lacomte, a rope dancer who died of the disease, marked atrophy of the anterior roots of the spinal nerves, and considered that in this was the real explanation of the pathology of the disorder; but although such atrophy has been found in a number of post-mortem observations, more frequently it was not observable.

Lesions of the sympathetic have been noticed in cases dying from the disease, but here, too, in the greater number of cases in which the sympathetic has been examined at all, no changes were manifest.

These different theories of the disease were tenable only so long as imperfect methods of examining the spinal cord were resorted to, and not until refined and exhaustive modes of research were adopted by Lockhart Clarke, Luys, and others, was new light thrown upon the subject. Want of space forbids quoting the observations of these authorities, but it may be stated that the weight of opinion is that progressive muscular atrophy depends upon lesions of the ganglion-cells of the anterior cornua of the spinal cord.

When thin transverse sections of a spinal cord affected with the anterior cornual degeneration just mentioned are made at a portion in relation with the atrophied muscles, examination with the naked eye may show no change whatever; with a low power apparent changes, in appearance as transparent spots, may at times be made out, but with a sufficiently high power the characteristic alterations in the gray matter can readily be determined.

The great multipolar cells are found to have almost entirely disappeared, and their place is occupied by granular masses, free nuclei, or, as has been observed, polynucleated cells. An occasional ganglion-cell may remain, but generally it is undergoing retrogressive change, is filled with dark granular matter, and is brownish in color; its polar prolongations have often entirely disappeared or seemed broken off. In such a section the whole cornu is diminished in size.

In another section of the cord appearances indicative of an earlier stage of the disease-process may be observable; the bloodvessels are markedly dilated, there is increase of the connective matrix, granular deposits are seen with degeneration, more or less advanced, of the ganglion-cells, which are brownish in color and lessened in size, while the disappearance of the nuclei, the granular aspect, and the evident diminution of the processes point to the ultimate atrophy and complete extinction of the cells in question.

The anatomical relation of the diseased portions of the cord with atrophied members or parts is easy to trace, but how purely motor cells can influence the nutrition of distant parts is hard to understand. The difficulty has been met by assuming that the ganglion-cells of the anterior cornua possess trophic as well as motor functions, and in advance of this view the existence of simply trophic cells in the cord, and even of a distinct trophic nerve system, has been put forward and ably supported, but as yet not by anatomical demonstration.

Examination of diseased portions of the cornua has repeatedly shown that some ganglion-cells, even though in the midst of degenerative activity, remain unaffected, and thus is explained the escape of certain muscular fasciculi from atrophy.

Atrophy of the anterior roots of the spinal nerves has been frequently noticed, and is believed to be due to a secondary atrophy of nerves arising from the diseased ganglion-cells.

Since progressive muscular atrophy is dependent upon lesions of the trophic cells of the anterior cornua, disease-processes in other portions of the cord can only be considered as accompaniments or complications. Atrophic degeneration of the antero-lateral and of the posterior columns has been seen in the same section of the cord, with the characteristic appearances of the anterior cornua already recorded, and Charcot holds that the symptoms of progressive amyotrophy are sometimes superadded to the classic symptoms of posterior or lateral sclerosis, etc. The combination, so to say, of anterior cornual degeneration with sclerosis of the lateral columns has been recently recognized as a distinct entity, and termed amyotrophic lateral sclerosis.

Symptomatology.—Progressive muscular atrophy is extremely insidious in its mode of invasion. Usually the first evidence of its presence is loss of strength and dexterity in the member or part selected by the disease as its initial point of attack; unwieldiness and feebleness is noticed by the artisan in handling his tools, or by the clerk in using his pen, or the common muscular actions of ordinary life are done with increased effort in supplementing the now discovered weakness. The difficulties enumerated direct the attention to the invaded part, but it may be that deficiency of contour is not noticed for some time,

Since the disease has a predilection for parts most frequently used, it might be expected that the right upper extremity would oftenest be its choice, and in the majority of cases the muscles of the hand, and especially those about the thumb, show the first signs of weakness and wasting. Roberts, Hammond, and others, state that the muscles forming the ball of the thumb are more commonly the first affected, but Eulenburg records with special emphasis his own observation that when the hand is the primary place of invasion, the interossei muscles, and especially the first interosseus, show the beginning of the disease.

Next to the hand, but at a large numerical interval, the earliest appearance of the disease is in the muscles about the right shoulder, and more rarely in the lower limbs, the face, the tongue, etc.

The inroads of the disorder are characterized by a certain degree of symmetry, so that in a large proportion of cases the involvement of a member is soon followed by that of a corresponding part of the other side; but where this rule does not hold good, the right side is oftenest implicated.

The mode of progression of the disease is peculiar; the hand-muscles may perhaps be destroyed, yet those about the wrist and elbow escape, the atrophy next attacking the shoulder muscles; or it may be that a single muscle or group of muscles escapes, while its immediate neighbors have undergone complete degeneration.

The reason why certain muscles do not succumb to the atrophy until late in the course of the disease is explained by Ferrier, *Journ. of*

Neurology, iv., 3. The extensors of the hand, although synergic with the intrinsic muscles and long flexors, and represented in the eighth cervical segment of the cord, are again represented in the fourth and fifth segments, and will consequently "retain considerable power as long as the latter two segments are intact; but when these are invaded, entailing atrophy in the deltoid and other muscles of the upper arm, the extensors also waste, and the *main en griffe* does not occur. The escape of the supinator longus, relatively more striking than that of the extensor group, is also readily explicable by its representation along with the flexors of the forearm in the upper two cervical segments." So of the triceps, which, according to Duchenne, is the last to be affected; Ferrier observes that it is represented in the sixth, seventh, and eighth cervical roots, and more frequently than any of the other muscles which have their centres there. As "it seems to be the rule for the degeneration to proceed either from the lower or upper end of the cervical enlargement, or, it may be, from both simultaneously, the centres for the triceps will naturally be long in being completely involved."

In the worst cases the disease extends from the original point of attack as well as from new ones, until all the voluntary muscles, except the levator of the upper lid, are involved; but in many instances, after destroying the muscular tissue of a member or part, the disease is arrested.

The deformity produced by the atrophy of muscles as such is heightened by the unimpeded action of their antagonists. The wasting, if in the hand, is shown by the loss of fulness about the thumb and in the palm, the flexor tendons being thrown into bold relief, while the dorsum of the hand shows with great prominence, as bony ridges, the metacarpal bones. The loss of the interossei permits the first row of phalanges to be drawn backward by the extensors, while the flexors and lumbricales keep the second and third rows in semi-flexion; thus is produced the "claw-shaped hand" or *main en griffe* frequently seen in this disease. If the wasting extends to the forearm, the loss of bulk as well as of roundness gives a flat appearance to the member, while, if the shoulder be involved, the bony prominences of the joint become apparent, and even at times the form of the head of the humerus may be distinctly visible.

In the lower limb the changes, if present, are quite well-marked, but owing to the anatomical differences do not appear so striking in the foot as in the hand; in the leg, a deep sulcus may show between the tibia and fibula anteriorly, or a profile of a posterior aspect may give a nearly straight line instead of the swelling curve of the calf. When the trunk-muscles are implicated, prominence of the bony framework becomes a marked feature, and the loss of the muscles of the back may cause the scapulæ to assume unnatural positions. Should the facial muscles be attacked, loss of plumpness and of expression in the diseased part appears, and when, in addition, the tongue is included in the disease-process, many of the symptoms of glosso-labial-laryngeal paralysis are present in some degree.

Since the failure of muscular power is dependent upon and co-extensive with the atrophy, the helplessness of the wasted limb or part varies accordingly; when the muscles of respiration are reached by the disorder in its onward march, even a slight intercurrent lung-affection may imperil life.

In infants, according to Duchenne, the disease not unfrequently begins in the muscles about the mouth, and thence extends downwards.

A very common phenomenon in the disease is the occurrence of fibrillary tremors or twitchings in the muscles near the surface of the body; they are often felt by the patient, and may consist of one contraction or a series, shown as a raising of the skin in vermicular motions, occurring without extraneous cause or being readily produced by external irritation, such as a tap with the finger, unusual exposure to cold air, etc. They are believed to indicate the involvement of the twitching fasciculi in the degenerative process. Cramp in an affected limb is occasionally present from contraction of one or more muscles.

Pain in or about the region of the affected muscles is present in a majority of cases; it is described as being neuralgic in character, and is considered by Hammond to be due to fatigue in muscles in which atrophy is just beginning.

Ordinary sensibility of the skin covering the affected parts is usually unimpaired; the cutaneous capillaries are in many cases dilated, and cold is more readily felt than normally.

The unaffected portions of a wasting muscle respond readily to the electric current, and the degree of contraction thus produced is, in uncomplicated cases, a measure of the proportion of muscle yet retaining its integrity. Discrepancies at times exist between the apparent bulk of the so tested muscle and the resulting response, since, occasionally, interstitial fatty hyperplasia may be sufficient to preserve the normal contour, the actual muscular loss being great.

A distinction is made by some writers upon this disease between varieties based upon its causation. According to Roberts, when it is the result of excessive use of certain muscles, the disease seems to be arrested "after the destruction of one or more groups of muscles," and this he terms the "partial" form; but when it arises "from exposure to cold or from hereditary predisposition," the disease becomes general in its distribution. Hammond believes that in the great majority of cases it progresses to a fatal ending.

In all cases the course of the disorder is slow and frequently interrupted by periods of greater or less extent during which it makes no apparent advance. In many instances the continu is measured by years, death ensuing at the end o more, yet in one case the fatal issue took place in t the beginning of the disorder.

Of thirteen cases ending in arrest of the disease was twenty-seven months. (Roberts.)

Prognosis.—As has been stated, when the dise sult of muscular over-exertion, the chances of arres considerable, but some writers, especially Eulen to doubt the correctness of including under th muscular atrophy cases in which the degenerati extend beyond the muscles at first affected. Excl Roberts termed partial, the prognosis must be exc the final outcome. The cases in which the diseas that is to say in which the atrophied muscles hav rare indeed, and those in which further extension permanently checked are greatly in the minority.

The following conditions are of evil portent: h causation by exposure to cold, invasion by the di muscles, or of all the extremities, long continuan and the co-existence of the other disorders dependi the cord, medulla, or brain.

Diagnosis.—In a typical case of progressive mu wasting beginning insidiously in one muscle or gr thence spreading in the manner already stated, the confined to the diseased muscles and limited in th responding to the amount of atrophy, the unalter all serve to distinguish the disease from others wi possibly be confounded.

Injuries to certain nerves, if unrepaired, will be f and paralysis of parts to which their motor and s distributed, but the paralysis sets in at once on re and wasting is rapidly completed, while the affecti

In lead palsy, infantile spinal paralysis, and adults, the paralysis precedes the wasting of mus trophic lateral sclerosis the same circumstance e peculiar spasmodic contraction. When the lesions which the latter disease depends extend to the mo cells on the floor of the fourth ventricle become peripheral manifestations are in some degree th muscular atrophy or of glosso-labial-laryngeal pal

When the central morbid process of wasting pal cells just named, the general symptoms of this di muscles of the tongue, face, pharynx or larynx, th of the affected organ with loss of power limited by ing. In amyotrophic lateral sclerosis the central morbid action affects both trophic and motor cells, and consequently both atrophy and paralysis are present if the disease have existed any length of time, but the paralysis appears first.

Fibrillary tremors are a very common feature in the two disorders, and, if present, serve to exclude glosso-labial-laryngeal paralysis, of which disease atrophy is not a symptom.

Structural changes in one portion of the cord may be followed by alterations in another, but the combination of anterior cornual degeneration with lesions in the white columns or posterior horns can here only be alluded to.

Treatment.—Preventive treatment in the strict sense is, as might be inferred, out of the question, but the assignable cause, if still in action, should be removed.

Most writers upon the disease attribute the most effective remedial influence to electricity. "As a rule, we alternately make use of central galvanization in its most thorough form, with faradization and galvanization of the affected muscles. Persistent faradization of individual muscles has been alone recommended by Duchenne, and among others who have reported recoveries by this simple and single method might be mentioned Dr. Alex. P. Fiddian." (Beard and Rockwell.)

The value of remedies in the treatment cannot yet be summarized. Plumbum and Picric acid have been reported as being of service. The anti-psoric remedies, particularly the metals, must be relied on.

Raue recommends Argentum nitricum, Arsenicum, Cuprum, Plumbum, Causticum, Sulphur, and Hughes adds Physostigma.

OSTEOMALACIA.

BY J. T. O'CONNOR, M.D.

Synonyms.—Malacosteon; Mollities ossium.

Definition.—A disease of adult life in which the earthy constituents gradually disappear from the osseous structures, with resulting loss of rigidity and firmness, and subsequent deformity.

It has only been within a recent period that the status of osteomalacia as a distinct disease has been established, and that it has be [illegible] separated, pathologically as well as clinically, from other disease [illegible] the bones in which abnormal softening and fragility exist. Aut [illegible] ties agree as to its rarity.

Ætiology.—Of the recorded cases of osteomalacia by far the [illegible] number were in women who [illegible] borne one or more child [illegible] remarkable is this fact that [illegible] be conceded by wri [illegible] the pregnant state is an ef [illegible] the production of th [illegible] for the proportion of nulli [illegible] who have been at

the disorder is, as nearly as can be made out,
Moreover, the disease, when existing, acquires a n
occurrence of pregnancy.

From the above facts it will be seen that the inf
in the causation of the disorder cannot be conside
period of fruitfulness, in women at least; in rega
as to the ages at which the affection first appeare
for use. In women, the records show that the g
the disease is between the twenty-fifth and fortiet

Inheritance seems to have no place in the ætiol
nor is the malady in any sense a consequence of
There remain then the conditions of life to be exa
for the origin of the ailment in question.

There is no real support for the view that the f
corded was deficient in lime-salts, or that to an e
of acid within the tissues in general could be
mineral matter. Experiments in support of the
is claimed, have been successful in producing artifi
the lower animals by the injection of lactic acid f
the use of lactic acid in large doses in the human
ment of diabetes has failed to produce any observ
bones.

The only condition of life in those affected by
ætiological significance, is living in damp room
only have observers called attention to the fact th
be apparently traced to such cause, but also, it is
notice, that cessation of its progress followed upo
the patients from damp habitations.

Morbid Anatomy and Pathology.—In th
fected bone, if examined microscopically, present
pearance of osseous inflammation in its earlier sta
progresses, the earthy constituents are withdra
advanced stages, there is only left the organic ma
changes, however, proceed from the medullary ca
way of the Haversian canals, with lessened acti
process proportionately to increased distance from

Microscopically, in the earlier yet active stages
medulla is markedly hyperæmic, and extravasatio
frequently seen; the color is more or less reddish
tion of oily matter determining the depth of tint;
tinues, and the oily matter increases, the color
yellow, the medullary substance often being of gel
and clearness.

In the short and flat bones the spongy portion ment of the Haversian spaces, and even in the compact tissue of these bones the lacunæ are often so extended as to present a spongy aspect.

The decalcification of bone, if complete, leaves only a somewhat soft, flexible mass of ossein, but in many cases at the periphery a thin shell of bony substance remains.

In many cases the periosteum shows evidences of inflammation, and then the underlying bony tissue is affected much like those portions nearest the medullary cavity.

The enlarged lacunæ and canals contain a liquid material whose color is either reddish or yellow, according to the predominance of debris of effused blood or of fatty material.

In the juice permeating the cavities of the diseased bones lactic acid has frequently been found as a constituent, and the fatty matter of bone has uniformly been observed to be increased.

In some cases the ossein has suffered some alteration, for the bones failed to yield gelatin on boiling.

From the foregoing statements it will be seen that the most important changes are the loss of lime-salts, the presence of lactic acid in many cases, and the increase of fatty material.

An explanation of the phenomena of the disease has been sought by assuming the presence of lactic acid in the blood which, when carried to the bones, decalcified them and set up also the changes resulting in the degeneration observed. But the objections to this hypothesis have not been overcome, and it is certainly more rational to suppose, as Senator suggests, that the lactic acid found in the diseased bones is but one effect of the disease-process going on in the bone itself. The result of the disease-process upon the osseous structures, so far as the loss of lime-salts is concerned, is precisely that which is observed when a bone is subjected, outside the body, to the action of dilute acids, and it is within probability that the decalcification of bones, as observed in this ailment, is a secondary and incidental occurrence. Further than is shown in the foregoing, we have no light upon the ultimate pathology of the affection, but when we consider the only cause of the disease, so far as observed, it may not be wide of the mark to assume some special derangement of function of some portion of the central nervous system.

Symptomatology.—In the earlier stages of osteomalacia the patient complains of vague pains, which are not referable to the bony structures till some considerable time has elapsed. The pains are specially felt after exercise, and may be accompanied by cramps in the affected parts. Soon tenderness on pressure is felt in the more exposed portions of the involved bones. The disease appears in most cases during or shortly after pregnancy, and is then found to affect chiefly the bones of the pelvis. In nulliparæ and in males the disorder may, and often does, appear first in the bones of the lower extremities or of the thorax.

Accompanying the pains is a progressively increasing weakness and a want of muscular power due to atrophic degeneration, which has been demonstrated to exist, and, indeed, by some authors, to precede in its beginning the bone disease itself.

The power of locomotion is much lessened from both causes just assigned, and, in addition, there is an effort, when the pelvic bones are involved, to enlarge the base of support in walking by keeping the legs as far apart as possible.

While the disease is distinctly progressive, there are periods of greater or less length during which its advance is imperceptible; but in women affected by it the recurrence of pregnancy gives a new impetus and an increased activity to the morbid process. From the pelvis the disease extends to the spinal column, the thoracic osseous framework and, finally, to the bones of the limbs; the bones of the cranium generally, and those of the face almost always, escaping.

In cases other than women who have borne children, the progress of the malady is much slower, but as it is not dependent on the pregnant state for a stimulus, it is without the periods of remission observed in such cases in which the non-occurrence of a new gestation often insures permanent arrest of the disorder.

The deformity observed in this affection varies with the part involved, and with the greater or less degree of decalcification present. As the disease oftenest appears first in the pelvic framework, it is in this portion of the body that we would expect to find most frequently deformity. Now, deformity of the pelvis alone, if not excessive, will only be observed in connection with the parturient state, and it is an interesting fact regarding a disease the recorded cases of which are very low in the hundreds, that of a series of 132 cases of Cæsarean section, performed in Great Britain and Ireland alone, in nearly one-half the pelvic deformity necessitating the operation was due to osteomalacia. (Observations on the Cæsarean Section, etc., Thomas Radford, M.D.)

The pelvis, in cases of deformity from the disorder, is compressed laterally, the pubic arch becomes abnormally prominent, and the sacrum, from the superincumbent weight, is thrust in a greater or less degree into the pelvic cavity.

In the spinal column the deformity assumes chiefly an exaggeration of the normal curve of the affected portion; in the thorax the distortion varies according to the usual position of the patient in bed; if mostly dorsal, the chest becomes flatter and broader than normal; if lateral, the flattening is at the sides, and the sternum projects. In the extremities the contortion depends for its peculiarities upon the stage of the disease as well as its intensity. In a case frequently quoted, "the thigh bone had curved so as to allow the left foot and leg to turn up by the side of the body;" "the humerus was curved about its middle from within outward, as well as the forearm, so that the middle part of the right arm was habitually applied against the internal malleolus of that side, while the middle of the left arm rested on the upper part of the tibia, just below the patella." (Markoe, Diseases of the Bones.)

When in the progress of the disease only a thin shell of bony tissue is left, fracture occurs readily from slight mechanical causes.

Analysis of the urine in cases of this disorder has thrown little, if any, light upon its nature; it might be supposed, *a priori*, that the earthy salts withdrawn from the bones would be found in the urine, but in repeated observations no notable increase of earthy phosphates could be determined; paralactic acid has been observed in the urine in a few cases, in one of which the acid gradually lessened in amount as the disease disappeared.

In the onward march of the affection the locomotor powers of the patient become lessened: first, from the muscular weakness already alluded to; and secondly, from yielding of the affected bones, while in some cases the tendency to fracture from relatively slight causes tends to confine the patient to a sedentary or recumbent position. As the abnormal flexibility of the osseous structures increases, the subject becomes more and more helpless, until, in the last stages of the disorder, voluntary motion of even a single limb may be an impossibility. Nevertheless, the bodily functions are usually fairly well performed until a comparatively late period in the disease, except some organ be unduly interfered with by the osseous distortion. Diarrhœa, however, is a frequent concomitant of the latest stage of the affection.

The duration of the disease, taking the mean of observed cases, is about six years; but one case is recorded in which the time from the beginning till the fatal termination was only three months, and one which only ended after thirteen years.

Death may occur as the result of exhaustion or of interference with some vital function by reason of some special deformity, as when thoracic distortion embarrasses respiration and ultimately causes death by asphyxia; pelvic deformity in this affection so frequently causes dystocia that operative procedures are often imperatively called for; the mortality ensuing thereupon is properly chargeable to the disease.

Diagnosis.—Osteomalacia is to be distinguished from rickets, carcinomatous infiltration, senile atrophy, and simple fragilitas ossium. As the disease is one of adult life, it is easy to separate it from rickets, and as it does not occur, primarily, after the fiftieth year, senile atrophy can readily be excluded. Carcinomatous infiltration of the bone is more rapid in its progress than is osteomalacia, and, moreover, the evidences of the cancerous cachexia are not long absent. Simple fragilitas ossium depends upon a want of cohesive with relative increase of the inorganic constituent to easy fracture is here the chief symptom, and, health of the subject is often good.

In the beginning of the disease it will be impc its presence, and not until the occurrence of son deformity can we be sure of our diagnosis.

Prognosis.—As, according to statistics, the rec lacia have been only a trifle over three per cent., considered as having an extremely unfavorable pr time, as has been already pointed out, those cases ence upon the pregnant state has been made o much more hopefully, provided no new pregnanc

Treatment.—This may be summed up in the if discoverable; if there be no assignable cause, th strictly symptomatic. The frequency with whi dwellings is a marked ætiological factor, would le possible value of Dulcamara as a remedy, or of N or Nux moschata. Of remedies having a powerfu nutrition, and hence of possible use in the disea made of Calcarea, Fluoric acid, Silicea, Staph Lycopodium, Manganum, Mezereum, Aurum.

OSTEITIS.

BY E. C. FRANKLIN, M.D.

Osteitis is an inflammation of bone-tissue, and molecular death and disintegration of its structur the bone becomes highly vascular and soft; nutriti ance or is wholly lost. It closely corresponds pat flammation of the soft parts, and results in a destruction of the tissues invaded.

Varieties.—Like inflammation of the soft part into the *acute* and *chronic* varieties. The acute is and attacks by preference the shafts of the long l tends to the medullary cavity it runs rapidly thi length of the canal, involving all the constituent p periosteum, bony structure, and medullary substan *osteo-myelitis.* When the acute variety appears in develop in the upper or in the lower limbs, prefe and it is associated with constitutional cachexy. quently the lower extremities of the femur and til

The *acute* form advances rapidly towards sup panied by intense fever, great pain, and occupies a of the affected bone. There are *three* varieties of the acute form of epiphysary osteitis.

In the *first* variety the suppurative inflammation appears to occupy only the external lamina of the periosteum, the suppuration taking place between the periosteum and the muscles overlying it. The abscess in this variety heals without either fistulæ or necrosis. The bony structure within is none the less involved in the inflammatory process, but it does not terminate in suppurative action, neither in the compact tissue nor in the medullary substance. It is the least dangerous of all the suppurative varieties of this form of osteitis, and is the least frequent in occurrence.

Second. This variety of osteitis, known by the older writers as *acute periosteal abscess and diffuse phlegmonous osteo-periostitis*, is not limited to the superficies of the bone, but occupies its whole parenchymatous structure after destruction of the periosteum; the inflammation invades the compact tissue and the medulla, but the suppuration involves the superficial rather than the deep tissues. The osteitis remains plastic, which causes the bony hypertrophy observed in such cases. If the neighboring articulation should become involved in the inflammatory disturbance to such an extent as to cause arthritis, with all the intensity that attaches to such structural derangement, still the inflammation does not end in suppuration, the absence of which latter feature is sufficiently diagnostic of this variety.

The *third* variety, which is the most dangerous form, because it is the most destructive to the involved tissues, implicates all the constituent parts of the bone, both in the inflammatory and suppurative conditions. The suppurative inflammation is propagated either along the periosteum or along the parenchyma of the epiphysis, and through the eroded diarthrodial cartilage to the adjacent synovial membrane. On account of the destructive processes involved in this variety of osteitis, it frequently terminates fatally through systemic infection, or, if the patient survives, in a prolonged condition of necrosis. This is the variety known by the less modern writers as *osteo-arthritis.*

Either of these three varieties may be determined by their characteristics. The first, or subacute, can be diagnosed by the absence of all severe symptoms, all the conditions being moderate in degree. If the periosteum has not been destroyed, there exists no denudation of the bone, as can be readily detected by aid of the probe. There can be no difficulty in distinguishing this, the subacute form, from the two other varieties which are more marked in extent and severity of their symptoms. The differences in the two latter are only in degree, and may lead to some confusion in classification, but not in the treatment. In both varieties the inflammatory disturbances, and all the resultant troubles of functional irritation, are well marked, and may be readily confounded one with the other. The pus in both varieties is the same, and the oily drops, dwelt upon by M. Chassaignac, are found in both forms of the disease, and proceed from the fat which exists in the bone as well as in the medullary cavity. The *differential* diagnosis of these two forms, which is only important in treatment, is the appearance of pus in the articulation, or the bare dislocated extremity of the diaphysis through the opening of the abscess.

The importance of the diagnosis centres in the fact that when the suppuration is superficial, and the articulation is not affected, the limb, as a rule, may be preserved under proper homœopathic treatment, but if the contrary obtains, the result is rarely satisfactory.

In the two latter varieties our treatment must not only comprehend the local manifestations present, but we should be keenly on the alert for systemic infection, and combat these symptoms whenever they arise.

Clinical History.—Osteitis occurs more frequently in children or youths of impaired constitutions, and may proceed from various causes. The attack is ushered in by rigors, a high degree of fever, accompanied by deep-seated boring, burning and throbbing pains in the limb; rapid swelling and œdema, with an erysipelatous blush on the surface, quickly terminating in abscess, with the inflammation extending and resulting in suppuration; matter pointing in various situations, with high fever recurring nightly. The patient may recover quite readily from the *first* form of the disease, but in the other two varieties the most favorable result is more or less extensive necrosis of the bone, and disintegration of the soft parts. If the disease extends to, and along, the medullary canal, it will probably terminate in an affection of the ends of the bones as well as of the shaft. Occasionally small abscesses form in the structure of the bone, which contain pus, mixed with the debris of the osseous structure. The part swells, is thickened, and a deep-seated pain is felt; aching, oppressive and intermittent, aggravated by movement and firm pressure; and deep fluctuation, both in the limb and in the joint itself, if abscess has formed. An ill-defined swelling, at first not well marked, but easily recognized by comparing the two regions, will be felt upon careful examination. The patient grows thinner and paler, and shows the attributes of the lymphatic temperament, which always shows a certain aptitude for suppuration.

Acute epiphysary osteitis is less frequent in childhood than in adolescence, and, as a rule, it is less dangerous. Of 92 cases collected by M. Sézary, 57 were between the ages of twelve and nineteen, making an average of thirteen years. M. Chassaignac tabulates 23 cases, of which 4 were under ten years, 15 from ten to eighteen years, and 4 from eighteen to thirty-six years old.

The muscles of the limb invaded soon become smaller than those of the opposite side, emaciation gradually increasing till atrophy with functional and organic changes is plainly apparent. Hyperostosis finally develops with the concomitant muscular atrophy as the result of osteitis, especially if the inflammation takes place in the long bones. This disease can generally be traced to an injury occurring in a vitiated system.

When the inflammation is chronic, these changes of structure occur slowly, the bone becomes gradually thickened and hyperostotic. If the patient recovers from the immediate effect of the injury, and the inflammation develops slowly, there is almost sure to follow more or less necrosis of the bones involved.

Treatment.—The treatment of osteitis in its early stages is quite analogous to the treatment of inflammation in the soft structures. In the first variety of the disease, when treatment is begun early and remedies are judiciously applied, much may be done to avert the serious consequences that are prone to follow. Attention should be given to constitutional defects during the entire course of medication, for these largely contribute to bring about and keep up the disease. In the first place, absolute rest of the affected limb must be maintained. If the larger joints are implicated, the limb should be secured against accidental injury or involuntary motion by suitable apparatus. While securing the necessary rest, both internal and external remedies must be diligently employed. The longer appropriate aid is deferred, the longer will be the course of the disease and the more resistant will it be to treatment. If the joint becomes involved, extension of the limb and separation of the diseased internal structures becomes a most important means of overcoming the inflamed process. No attempt at passive motion should be made till the inflammation has subsided and the pain greatly diminished. After motion has been fairly established, active exercise may be gradually permitted, and the patient placed under the most favorable hygienic and dietetic influences. When an abscess has formed (caries), it should be promptly opened and the imprisoned pus evacuated to prevent septic contamination.

When all efforts to check the progress of the disease fail, and the inflammation attacks the deeper structures, recourse must be had to more active measures in order to prevent necrosis of the bone and consequent infiltration of pus into the joint. This may be effected by removal of the diseased structures and treating the case as ulceration of bone tissue. This may be done by the scraping or gouging process, or removal, if necessary, of the articular extremities of the diseased bone. When the disease is very extensive, and all other means have proved unsuccessful, resection or amputation may be the only recourse left to preserve the life of the patient.

The internal remedies most to be relied on for the cure of the inflammatory process are:

For the *acute* variety: Aconite, Arsenic, Belladonna, Asa fœt., Mezereum, Mercurius, Hepar sulph., Manganum, Nitric acid, Ruta, Staphisagria, Calcarea carb., Silicea, Symphitum.

For the *chronic* variety: Asa fœt., Calcarea carb., Calcarea phos., Fluoric acid, Hepar sulph., Mercurius, Phosphorus, Hecla, Phytolacca, Phosphoric acid, Silicea, Theridion, Carbo an., Gettysburg, Lactic acid, Ruta, and Sulphur.

Epitome of Treatment.—For interstitial inflammation of bones: Arsenic, Belladonna, Asa fœt., Lycopodium, Mercurius, Silicea, Calcarea, Mezereum, Symphitus, Mercurius, Phosphorus, Staphisagria.

For *softening:* Calcarea, Hecla, Mercurius, Silicea, Sulphur, Hepar, Lycopodium, Mezereum, Phosphorus, Ruta, Staphisagria.

Special Indications.—**Aconite.**—This remedy, given in the earliest stages of osteitis, has in my hands either aborted a threatened attack or so materially modified it as to make it of easy control by other remedies; after true inflammation has set in, with degeneration of tissue, its value is chimerical.

Arsenicum.—In tearing, burning, or lancinating pains in the bones, with hypertrophy of its structures; œdema of the limb; uneasy feeling in the limb; continual moving of the limb as if to secure an easy position. The slighest paroxysm of pain is followed by prostration. Painful stiffness in the limb, with intolerable pains during the inflammatory period, or, after the pus has been evacuated, there is prostration with hot, dry skin, the discharge being thin and bloody, or fetid. When the abscess assumes a gangrenous character, with debility, chills, and sweat.

Asa fœtida.—Inflammation of bone with tearing, tensive, sticking pains in the part, aggravated by movement; dark-red, hot swelling of the parts; violent painfulness of the bone when touched. Pain as from a deeply penetrating plug in the bone; intermittent, pulsating, or oppressive darting pains; nightly syphilitic or mercurial bone-pains.

Belladonna.—Congestion of bone-structure; pain in the bone as if bruised; lacerating and drawing pains; scrofulous persons with glandular swellings; interstitial inflammation, tending to erysipelas; unquenchable thirst, dry tongue, hot and pungent skin in persons of a nervous temperament, in lymphatic constitutions, and especially in the constitutional symptoms that arise during the suppurative stage.

Calcarea carbonica.—Swelling and softening of the bones. Thickening of the long bones in cachectic constitutions. Crackling and crepitation in the joints as if they were dry. Exostosis and caries of the articular extremities of bones. It has a more direct influence on the constitutional depravity than over the local morbid action in the bones.

Fluoric acid.—Inflammation of the long bones, with a tendency to suppuration in psoric or syphilitic persons.

Mercurius.—Inflammation and interstitial thickening of bony structure, worse at night; osteocopic pains of a dragging, lacerating character. The bones feel as if broken; scrofulous periostitis.

Mezereum.—Pain in the periosteum of long bones, especially in the tibia; intolerable at night in bed, and in damp weather. The least touch is unbearable; swollen periosteum; pain so violent as to prevent the least weight upon the foot. Particularly adapted to periostitis and before complete suppuration has set in.

Phosphorus.—Inflammation of bone with tearing, boring pains, worse at night; swelling of the tibia; pain as if bruised in the periosteum of the tibia, painful to the touch; osteitis succeeded by phthisis, with increasing colliquative diarrhœa. It acts more promptly upon the bones of the upper portion of the body, as the clavicle and humerus.

Hepar sulph.—Inflammation of bone terminating in abscess; in lymphatic constitutions; in profuse suppuration, the abscess presenting an unhealthy appearance; pains aggravated at night; accompanied with exacerbations of fever.

Kali jod.—I have used in those cases where the bone-tissue was dense and compact; the inflammation is of a chronic type, with hyperostosis. The bone is elongated and the muscles atrophied.

Staphisagria.—Osteitis, especially of the phalanges of the fingers.

Stillingia.—Scrofulous periostitis.

Theridion.—Scrofulous constitutions, when other remedies fail to reach the root of the evil and to destroy the cause.

Local Medicaments.—In quite a large practice in diseases of bones I have witnessed the most satisfactory results follow well-directed local measures, such as the elevation of the limb, hot fomentations, or poultices of the indicated remedy constantly applied. Erichsen recommends in addition to the above remedies a *linear* incision down to and through the soft structures to the bone. M. Ollier advocates the sub-periosteal exsection of the diseased bone. Whatever operation is performed, care must be exercised that the tendinous insertions of the muscles are not interfered with, so as not to disturb the muscular action of the joint.

CARIES AND NECROSIS.

BY E. C. FRANKLIN, M.D.

I shall consider these under the same head, as they are both the result of previous inflammatory action in bone structure, and are both described by recent authors as death of the bone, caries by the gradual process of molecular destruction, necrosis by the ultimate destruction of bone in mass. In *caries* the bone-tissue undergoes a morbid change, disintegrates, and is discharged in the form of pus mingled with bone elements. In *necrosis* the bone-tissue undergoes a morbid change, its vitality is destroyed, but its structure is retained in mass. In both the result is death of bone-tissue, and the same destructive process brings about both conditions, the only difference being the degree of its violence and its termination. Caries, as a rule, invades the cancellated structure of bone, while necrosis usually attacks the hard structure of bones and their shafts. Caries occurs in persons of a cachectic habit of body; necrosis takes place in systems exhausted by disease, as in syphilis and scrofulosis. Nutrition in caries is impaired; in necrosis it is totally arrested. Caries corresponds to the necroto-reparative variety of inflammation, repair going on *pari passu* with the disintegration. Necrosis is the necrotic variety of inflammation without the power of repair in bone deprived of its vitality. Caries holds the same relation to necrosis which gangrene holds to mortification, or ulceration holds to sphacelus. Both are prone to follow osteitis.

The early symptoms of caries are much the same as in abscess, and both are preceded by pain, tenderness, and swelling, all the phenomena of inflammation being present. Caries tends to create cavities within bone. Necrosis is superficial, and usually attacks the compact structure of bone, where vitality is less vigorous, and consequently less resistant to the inflammatory process. Caries, like necrosis, is preceded by the inflammatory process, viz.: pain, tenderness, swelling, and suppuration. The vitality of the bone structure is destroyed by the severity of the attack, and, as a consequence, caries is developed, then final separation of the dead bone, the line of demarcation being formed between the living and dead structures—necrosis. Caries is the true inflammation of the third stage of my classification (viz.: disintegration), and necrosis is one degree further removed from this, to wit: death or exfoliation in bulk where the surface, shell, or scale is separated from the adjacent bone. When a portion of the deeper bone structure is thrown off as the result of inflammatory action, it is called *sequestrum*.

In caries there can be no separation of the bone elements without death of the molecules, so there can be no separation of an aggregation of molecules (necrosis) without structural death. The separation of a molecule and a portion of dead bone is effected much in the same way in both instances. As soon as molecular disintegration takes place, or dead bone has been detached from the living, the process of repair begins; granulations spring up from the healthy surface, either separating the molecule or pushing aside the exfoliated bone. This is nature's method of overcoming the difficulty, but it sometimes happens that the sequestrum is too large to be removed in this way; then it is that the new bone throws a wall of ossific tissue around it, and envelops it in a sheath which it may take months and perhaps years to finally dispose of. If the suppuration is excessive, the system suffers correspondingly, and the patient may die, if not relieved by a surgical operation, before the offending mass is entirely removed.

Treatment.—The first thing to be done in the treatment of caries and necrosis is to check inflammatory action and to overcome systemic implication. If they arise from syphilitic taint, struma, or constitutional infection, the dyscrasia should be eradicated, for it frequently happens that when these are removed, the disease spontaneously disappears. Hence it is better in adolescents, especially where disease attacks the smaller bones, to exhaust all systemic treatment before resorting to operative measures. If the disease becomes chronic, and the remedies employed are not competent to effect its elimination and to restore the integrity of the part on account of the local disturbance continually going on in and about the carious bone, recourse must be had to operation. This comprises three methods: *first*, the simple removal of the diseased portion; *second*, excision of the articular end; *third*, amputation of the whole of the diseased bone. By the first process caries is often entirely removed and necrosis prevented, so that the treatment of both these results of bone inflammation is similar, and therefore will be considered under the same head. The removal of the carious portion of bone is best effected by means of the gouge, the bone forceps, bone brace and bits, and the osteotrite. In removing carious bone with instruments, the surgeon should know when he has cut away enough. This is ascertained by the textural nature of diseased and healthy bone; the former under the instrument is soft, gritty, and yields readily; the latter is hard and resistant. When all diseased bone is removed, the walls of the cavity will be felt smooth and compact. Carious bone may be distinguished from healthy or inflamed bone by washing it. If it is healthy, it will present a reddish tinge; if carious, it will appear either white or dark-colored. In operating for caries or necrosis the surgeon should be cautious about injuring the sound bone, lest the reparative process may not be able to bridge over the chasm between the walls. After all the diseased portions have been removed, free use should be made of the syringe to effect thorough cleansing of the diseased cavity. If any bony particles are left behind, irritation will be kept up and the reparative process prevented. More or less hæmorrhage follows operations upon bony structure, the blood proceeding from minute arteries or from the capillaries, flowing out in a continuous stream. Ligature, the cautery, or the heated iron-wire may be required, according to circumstances, in the former variety; while in the latter, frequent applications of cold water will ordinarily arrest the flow. Should the hæmorrhage not be controlled by this process, the cavity may be filled with pledgets of lint saturated with a solution of *Erigeron*, *Hamamelis*, or the *persulphate of iron*, the dressings being retained no longer than is necessary to control the bleeding.

After hæmorrhage has been arrested, the cavity should be filled with charpie or lint saturated in *Symphytum* or *Calendula* lotion, the edges of the wound closely adapted by adhesive strips, a roller applied around the limb, beginning at its distal extremity and applied upward to the seat of operation, and the limb placed in a favorable position for drainage. Medicated dry or wet dressings may be used afterwards, as the case demands, and the proper remedies administered internally to meet the indications.

The chief dangers which follow these operations are septicæmia and erysipelas—results which it is only necessary to mention to secure the earliest attention of the surgeon.

Excision of an entire bone is sometimes necessary for the cure of this disease, and the small bones, more frequently than all others, demand this operation, a useful limb being generally left after the removal of several of these bones. In the long bones resection is usually limited to the articular end or to this and a portion of the shaft. In necrosis, until a line of demarcation has formed, it is impossible to say how much or how little of the bone has lost its vitality, and the surgeon should not interfere till nature has completed the work of reparation.

Under these circumstances a tentative operation may be undertaken after the lapse of a moderate time.

Amputation should only be resorted to as a last resort and when all other means have failed in effecting a cure, and when the attendant discharges are so copious as to give rise to profuse night-sweats, marasmus, and colliquative diarrhœa which jeopardizes the life of the patient.

Therapeutics.—**Angustura.**—Caries of the long bones; great sensitiveness of mind; irritability from the slightest provocation.

Asa fœtida.—Caries or necrosis in scrofulous subjects; after the abuse of Mercury; bluish redness and swelling of the external structures; ulcers with hard, bluish edges, very painful to the slightest touch; pus thin and offensive.

Aselli jecor.—Affections of the bones in scrofulous subjects, especially when the extremities of bones are affected; caries or necrosis; fistulous ulcers with raised edges, bleeding easily, and discharging a flocculent pus and ichor.

Aurum.—Caries or necrosis of the nasal bones from ozæna, accompanied with a fetid smell; caries of the bones of the face, attended with a boring pain; necrosis after the abuse of Mercury; nightly osteocopic pains, so severe that the patient does not care to live; inflammation of the palate and nasal bones.

Calcarea carb. et phos.—Caries and necrosis in children; swelling and softening of the bones; necrosis and caries of the ends of long bones. *Calcarea phos.*, fistulous ulcer in long bones, with callous edges and putrid, ichorous discharge.

Fluoric acid.—Caries of the long bones; caries and necrosis in syphilitic patients; caries of the bones of the head.

Gettysburg.—Caries with ulceration of joints, with thin, ichorous discharge (Silicea).

Hecla lava.—Osteitis; periostitis, involving contiguous bone. It affects mostly the bones of the head, jaws, teeth, and legs.

Lycopodium.—Caries and fistulous ulcers, with hard, red, shining, everted edges; inflammatory swelling of the affected parts; bleeds easily; nocturnal bone pains, especially at the end of the inflamed bones.

Mercurius.—Disease of bones, worse at night. Bones feel as if broken; scrofulous periostitis; caries, necrosis, and ulcerations of bone; osteocopic pains.

Manganum.—In caries of the tibia following periostitis; children will not put the foot to the floor for fear of the pain.

Nitric acid.—In syphilitic affections and after the abuse of Mercury; carious ulcers, with irregular edges, bleeding easily; stinging pains.

Phosphoric acid.—Caries and necrosis of scorbutic patients; pains worse after cold or extreme heat; a feeling as if the bone were scraped with a knife; internal osteitis, with threatening abscess (Hepar). Scrofulous, syphilitic, or mercurial osteitis; interstitial inflammation, with burning, gnawing pains; external parts black.

Silicea in nearly all diseases of the bone; fistulous openings; offensive discharge; parts around hard and swollen; necrosis, with bluish-red appearance; fistulous openings, with discharge of thin pus and bony elements.

Staphisagria.—Caries in the phalanges of the fingers; arthritic nodosities; necrosis of small bones.

SYNOVITIS.

BY E. C. FRANKLIN, M.D.

By this term are designated those changes which occur within a joint dependent solely upon an inflammatory condition of its synovial membrane.

Inflammation affecting this membrane ordinarily results from an injury directly applied to the joint, a severe strain or wrench, by which its lining membrane is affected, exposure of the joint to cold, dampness, or to atmospheric vicissitudes, or by an extension of inflammation through adjacent structures.

This type of disease is essentially local in its character, and is usually confined to a single articulation. The degrees of severity which the synovial membrane assumes have led authors to classify them into *three* varieties, according to the extent and violence of the local disturbance. First is the *acute* form, in which the inflammatory changes are excessive and involve more or less systemic disturbance; the *subacute*, where all the local and constitutional phenomena are less marked; and the *chronic* form, where the evidences of active inflammation do not exist at all, or are so moderate as to escape the observation of the practitioner. These are the simple or uncomplicated forms of synovial joint disease, and are really diseases of no great magnitude, owing to the readiness with which they yield to well-directed remedial measures. When, on the contrary, the system of the individual is impaired, either by toxic, constitutional, or hereditary influences which predispose to the development of synovitis, then this otherwise simple disease takes on the most severe and obstinate characteristics. Among the constitutional causes may be enumerated scrofulosis, syphilis, gonorrhœa, pyæmia, upon each of which the peculiar characteristics of each are impressed; the latter belong more especially to the domain of surgery.

ACUTE SYNOVITIS

Is relatively more frequent in males than in females, and in adult life than in youth. It may be confined entirely to the lining membrane of the joint, or it may extend beyond, and involve its denser structures and even the bone itself (arthritis).

Symptoms.—The phenomena indicative of acute synovitis vary greatly with its exciting cause, the size of the joint affected, the severity and extent of the inflammatory process, and the constitutional state of the patient. Involvement of the hip-joint produces greater local and constitutional disturbances than any other articulation in the body: heat, pain, gradually increasing in intensity, with exquisite tenderness, early and rapid swelling, which is one of its differential characteristics, as it protrudes between the bony prominences wherever it can find room to expand. In the knee-joint it assumes the form of a horseshoe around the borders of the patella, between it and the condyles of the femur. This is characteristic. Fluctuation will be distinctly felt; the limb is flexed, stiff, and difficult of movement, and great constitutional disturbance exists. If the hip-joint is affected, the pain is often located away from the source of the disease, the evidence of the irritation is reflective, and is felt at the peripheral distribution of the nerve.

Pathology.—During the early or inflammatory stage the synovial membrane is red and vascular, and as the disease continues it gradually becomes thickened and villous; serum is thrown out into the cavity. This at first is clear and limpid, and subsequently becomes turbid and contains flakes of lymph, or it is mixed with blood, and finally assumes purulency which indicates cartilaginous ulceration.

In superficial joints, fluctuation can be readily detected in the active or inflammatory state, but in the chronic form detection is less easy, owing to the products of the inflammatory process becoming organized, thus impeding the transmission of the impulse wave. The flexion of the joint is due both to overdistension of its cavity and to the more powerful contractility of the flexors of the limb. A long continuance of the disease leads to false anchylosis of the joint. The subacute variety is a modification of the preceding in all its important essentials. Treatment of joint-diseases will be considered at the end of the chapter.

CHRONIC SYNOVITIS.

This is often the result of the inflammatory or acute type, though it occasionally begins as a chronic form from its incipiency and is the result of some constitutional taint, such as scrofulosis, rheumatism, syphilis, gout, or gonorrhœa. It is not always possible to define the exact blood deterioration of the system to which each particular case belongs. As a rule, there is a disproportion of the amount of swelling within the joint and the accompanying pain, the limb oftentimes suffering considerable impairment of motion without the presence of any marked degree of pain.

Symptoms.—There is less pain and tenderness than in the acute form, but the joint is swollen, and the synovial membrane thickened and pulpy. If tolerably firm pressure is made upon the joint, a fine crackling sensation will be conveyed to the fingers, the effect of serous effusion into the interstices of the areolar tissue. In some cases a feel as of some floating body within the joint is conveyed to the fingers when firmly held over the articulation. Chronic synovitis without systemic contamination commonly terminates in recovery, although relapses frequently occur if the practitioner is not upon his guard to prevent them by appropriate internal treatment. If the accumulation of fluid within the joint increases, without evidences of inflammatory symptoms, there will be present a condition of disease termed *hydrarthrosis* or *hydrops articuli.*

FLOATING CARTILAGES IN JOINTS.

These little accretions are most frequently met with in the knee-joint, and are the result of a thickening of the fringes of the synovial membrane, from a chronic inflammation of its substance. They are usually composed of organized fibrous material, gradually assuming a cartilaginous structure, and moving within the joint where they can be felt and removed. Occasionally they get between the articular surfaces, where they give rise to intolerable pain and sometimes cause the patient to fall suddenly, as if struck down with a blow. They vary greatly in size, from a small kernel of corn to an inch in diameter, are oval, round, or flattened-out like a disc, and oftentimes exist in considerable numbers within the joint. After an attack has once developed, the patient is liable to repeated returns without appreciable cause.

Rhus tox., in the higher potencies, is said to have cured a very troublesome disease of this kind, but I have most confidence in an operation for their removal. (Franklin's Surgery, 2d edition, p. 80.)

TUBERCULOSIS OF JOINTS.

Synonyms.—Scrofulous synovitis, Strumous synovitis, White swelling.

This is a peculiar form of synovitis developed in joints, and always occurring in persons of a strumous or tuberculous habit. Beginning in the synovial membrane or in the cancellated structure of the bone, it gradually pervades all the hard and soft tissues of the articulation. It occurs chiefly before the age of puberty, and its exciting cause is often traced to a trivial injury, a blow, a sprain or a fall. The synovial membrane becomes vascular and pulpy, the subcutaneous tissues are soon involved, and assume a swollen and thickened appearance. In its early stage there is a mere sensation of stiffness in the affected joint, associated with a soft, elastic and colorless swelling covering the whole aspect of the joint, which is most apparent in the superficial joints. Soon the ends of the bones become involved and enlarged, the cancelli dilate and are filled with fat or tubercular matter, and all the joint structures gradually participate in the destructive process. When the disease is fully established, the joint has a characteristic appearance; it is gradually and uniformly enlarged, the *surface is pale*, the *skin doughy* or *œdematous*, with blue veins traversing it. Fluctuation cannot be detected in scrofulous synovitis, the exudation being too gelatinous to transmit the wave-like impulse. This latter condition distinguishes it from synovitis or dropsy of a joint of a purely inflammatory type.

The patient lies with his limb semi-flexed; pain is not a prominent symptom except on motion of the joint. The muscles of the affected limb waste, with a gradual loss of power. Crepitation is felt whenever the destructive process involves the denser structures of the joint, unless exuberant granulations for a time mask the true condition of disease. At this time the general health suffers, the constitutional cachexy is painfully evident, and the suppurative process indicates that destruction of the joint is an accomplished fact, and the patient falls into a state of hectic.

If the progress of the inflammatory process is checked before suppuration sets in, there will be a gradual tendency toward recovery; the external swelling assumes a less elastic, more solid feel, and diminishes in size, and the appearance gradually approaches the normal standard. The joint slowly regains its full capacity of motion, but there exists a tendency to relapses which must be diligently combated by appropriate medication.

RHEUMATIC SYNOVITIS.

In this disease the joint is primarily affected, and the constitutional trouble is a secondary result of the local disturbance, which is directly the reverse in rheumatism. It is developed by cold, dampness, exposure, and climatic changes in sensitive subjects, and first develops in the synovial membrane rather than in the fibrous tissue, the favorite seat of acute rheumatism or rheumatic fever. It is independent of any excess of lactic acid in the blood, a point raised by late authorities as one of the predisposing causes of acute articular rheumatism. Its symptoms present no special distinction from other forms of acute synovitis, save in its manner of attack and its apparent indirect connection with some abnormal state of the system at large.

Treatment.—The treatment of the foregoing varieties of joint disease depends upon the exciting cause and the severity of the disease. It must be remembered that dropsy within the joints, like the same condition in other parts of the body, is a consequence of previous inflammatory action, and demands the attention of the practitioner to the causes producing it. When dropsy is the result of sprain, contusion, or other injury, we find an appropriate remedy in one of the following: *Aconite*, *Arnica*, *Hypericum*, *Ruta grav.*, or *Rhus tox.*, internally and externally. Elevation, rest of the limb, a judicious use of the roller, with an easy and relaxed position of the parts, accomplish satisfactory results. In the milder forms of dropsy, friction with the hand, electricity, *aconite* embrocations, *iodine* and *cantharides* ointments, rarely fail to promote absorption of the effused liquid and relief of the tension caused by the swelling. The selected remedy should be applied three or four times a day by rubbing the affected part briskly with the palm of the hand till a decided glow is felt, then discontinued, to be repeated whenever demanded. Firm and well-regulated pressure by the roller exercises a potent influence in reducing the effused fluid. The cold douche, or the alternate application of hot and cold water, applied in quick succession, is an adjuvant of no little value in overcoming effusions within cavities. If the hip or the knee joint is affected, relief is procured by *extending the limb* by the aid of a weight graduated to meet the muscular resistance to be overcome. If the attack is associated with any constitutional vice, remedies are demanded which respond to the disease-producing force. If rigors occur and there is reason to suspect suppuration (*arthropyosis*), aspiration should be promptly performed, and the imprisoned fluid withdrawn; then apply uniform pressure by means of a dry sponge laid over and covering the joint, and a roller over all; the sponge should be kept wet with a solution of the indicated remedy. In traumatic cases I have found excellent results follow the use of dry cotton having been previously saturated with hypericum, covering the joint with it, and applying an India-rubber roller over all. In persistent inflammations within the joint, relief follows frequent rubbings of the part with tincture of Iodine, Cantharides, or Capsicum over the diseased joint, applying the dry cotton and roller immediately afterwards.

The practitioner need not despair in effecting a cure, even under the most unfavorable circumstances, if he selects his internal remedies judiciously, and persists in the bandaging, frictions, stimulations, lotions, and the douche. Even under the most adverse circumstances, when all our efforts have proved unavailing, and the result looks only to an anchylosed joint, it must be remembered that an anchylosed joint is always better than no joint, and the limb should be placed in a proper position for future usefulness.

The internal treatment of the acute and chronic forms of synovitis is guided by the same general principle that governs inflammation in the soft tissues. If the inflammation is severe, and the system participates in the diseased action, with sharp drawing pains in the joint, with fever, thirst, chilliness, and more or less prostration, no remedy acts more promptly and efficaciously than *Aconite*. The Aconite should be continued till the severe symptoms disappear or are greatly ameliorated, when another remedy may be employed to carry the case to a successful termination.

Aconite.—In severe inflammation with systemic fever, hot dry skin, full and active pulse, in strong healthy constitutions, shining of the parts, furred tongue, tensive sticking pains in the joint, internally and externally.

Belladonna in subacute synovitis, when the blood-flow is more congestive than active, with flushed cheeks, dull heavy pain; wandering pains. are accompanied with redness and swelling about the joint; exacerbating at night; attended with hot dry skin, thirst, and fever.

Bryonia.—The pains are tearing and stitching, with stiffness and swelling in the joints; sallow countenance; tongue coated with a brownish fur; skin hot and dry; acid perspiration; frequent and soft pulse; bitter taste, or dryness in the mouth; all symptoms aggravated by movement; when the fever is less of an inflammatory type than that which calls for the two preceding remedies.

Causticum.—Stiffness of the joints; subacute form of inflammation, or when the disease assumes an indolent type; bruised, tearing, or sticking pain; profuse sweat; numbness of the part; all the pains aggravated in the evening; swelling prominent, with fluctuation and tendency to hydrarthrosis.

Ledum.—Acute traumatic synovitis, with effusion into the joint; parts sensitive to pressure. with feeling of coldness in the part; aching tearing pains. It exercises a profound action on the absorbents, and relieves effusion. It is specially adapted to subacute affections of the knee-joint.

Iodum.—In the second and third stages of the disease; fistulous openings, with discharge of a thin, watery ichor; borders of the sinuses pale and spongy, bleed easily; feverishness and emaciation; tearing pains, with swelling of the parts.

Kali iod.—In the first and second stages, with a doughy, spongy swelling of the joint, without fluctuation; skin tense, red, and hot; a feeling of heat inside the joint; gnawing boring pain at night, necessitating a constant change of position.

Lycopodium.—In the later stages, with aggravation of fever and pain in the evening; violent jerking of the limb; slight swelling; moderate effusion, with slight fever; the joint feels as if encircled by a band; pains relieved by warmth or aggravated in cold rainy weather.

Colchicum.—Inflammation of the smaller joints; tearing, jerking, lacerating pains, worse at night, increased by care or anxiety. Stiffness and lameness of the joint during movement; skin moist; urine turbid; worse in wet cold weather.

Mercurius.—In the first and second stages. Prominent aggravation at night; restlessness, with profuse, non-alleviating sweat; feeling of coldness and chilliness; suppuration threatening; cachectic system; syphilitic or strumous synovitis, with tendency to complete destruction of the joint.

Rhus tox.—In the second and third stages, after inflammation is overcome; stitches and tearings in the denser tissues of the joint; tendons outside the joint involved; rigidity of joints; stiffness of the joints, especially when all the indications point to a typhoid condition; in slight attacks; pains increased during rest; great restlessness (Arsenic); when the disease extends to the denser structures rather than in the synovial membrane.

Calcarea carb.—In scrofulous habits; in second and third stages; to correct cachexy in slight cases from the onset of the disease. Drawing pressure in the joints; external parts of a waxy white appearance; swelling boggy from the onset; discharge from fistulous openings.

Silicea.—In impaired constitutions; in second and third stages; pale, earthy complexion; destruction of the soft parts, the disease extending to the articular ends of the bones; threatened caries; constitutional disturbance; constant and obtuse pain; swelling boggy and uneven; bony suppuration everywhere.

Sulphur.—In strumous patients, to overcome systemic taint.

Among other remedies whose clinical effects demonstrate their usefulness in these diseases are *Cimicifuga*, *Phytolacca*, *Ruta*, *Rhododendron*, *Viola odor.*, *Viscum alb.*, *Apis mel.*, *Nux vom.*, *Natrum*, *Phosphorus*, *Strontium*.

PODARTHROCACE.

Abscess of the ankle-joint, like abscesses in other articulations, is the result of previous inflammatory action attacking the structures of the joint. It commences with pain, heat, and swelling just in front of each malleolus, filling up the depressions on either side, and puffing out the joint and surrounding it like an anklet. It extends backwards and obliterates the grooves at the sides of the tendo Achillis, and the whole joint is extensively distended. Like the internal tissues of other joints, the inflammatory process often terminates in suppuration, which burrows externally, breaks, and gives exit to the pus by a number of openings. These fistulous openings give exit to the discharge as fast as formed, and in time the articular ends of the bones forming the joint yield to the disintegrating process, and caries or necrosis is the inevitable result, with anchylosis of the affected joint.

Treatment.—Consult the remedies in preceding chapter.

BURSITIS.

BY E. C. FRANKLIN, M.D.

The bursæ, which consist of small sacs or pouches, in various parts of the body, are subject to inflammatory action from different causes, as strains, external violence, blows, etc. Bursæ are lined by a membrane resembling the synovial in function and appearance. When they become involved by inflammation, there is an increase of the secreted fluid, which may be either *acute* or *chronic.*

Acute Bursitis.—In the acute variety the inflammation is active, the pain is severe, tensive, and throbbing, with more or less swelling and fever. It is distinguished from synovitis by its superficial character and the regularity of the tumefaction. The parts become exceedingly tender, swollen, œdematous, and highly congested, the skin becoming hot and of a dark reddish color. More or less constitutional disturbances ensue, such as fever, headache, thirst, restlessness, and loss of appetite. This condition often terminates in suppuration, the pus generally being thin, oleaginous, and mixed with flaky lymph, though occasionally it is found thick and intermingled with shreds of a sloughy consistence. The bursa over the patella is most often affected in this way, constituting what is known as "housemaid's knee." The tumor is elastic, very painful, and tender to the touch.

Chronic Bursitis.—Chronic inflammation of the bursæ occasionally gives rise to structural changes, the most common of which is an indurated and hypertrophied condition, the result either of long-continued interstitial deposits or the formation of adventitious membranes. The walls of the affected sac become extensively thickened, of a dense fibro-cellular consistence, and without the slightest trace of its primitive character. Under these conditions the cavity of the pouch is generally small, filled with altered synovial fluid, and so rough upon its surface as to present an appearance not unlike that of a honeycomb. Now and then shreds of lymph are stretched across its interior, dividing it into several compartments. In long-standing cases, partial ossification of the cyst has occurred.

Ordinarily the inflammatory action is due to straining of the parts or to pressure, and is frequently so mild as to result only in an increased secretion, the fluid within the sac being little changed from ordinary synovia. In other instances the fluid changes to a thick, gelatinous consistence, sometimes even resulting in the formation of a solid tumor.

Different names are given to these enlarged bursæ, according to the locations in which they are found; thus, those in the bursæ of the tendons, on the front and back of the wrist, are called *ganglia*, while that in the vicinity of the knee-joint is named the *housemaid's knee.*

Bunion

Is the chronic inflammatory enlargement of the bursæ situated on the inner side of the head of the first metatarsal bone. It is at times exquisitively painful; if it becomes actively inflamed and suppurates, a thin, unhealthy discharge is apt to continue for a length of time. It is caused by pressure of boots which are too short and too narrow across the toes, and in many instances the great toe is distorted, twisted, and pressed over and upon the other toes. The integuments over the joint become enlarged and thickened, the bursa increases in size, the effused fluid produces swelling over the joint, pain increases, suppuration ensues, and caries of the bones or exfoliation of the joint may take place.

Treatment.—The treatment of acute bursitis is both medical and surgical. The remedies found serviceable in the first stages of the disease are *Aconite*, *Arnica*, *Hypericum*, and *Belladonna*, the heat, pain, and swelling of the part being considerable, and attended with corresponding febrile excitement. Other remedies of value in less inflammatory conditions are: *Antimon. crud.*, *Ledum*, *Sticta pul.*, *Graphites*, *Hepar*, *Iodine*, *Mercurius*, *Rhus*, and *Silicea*.

Aconite.—When the pain is excessive; inflammation acute; swelling of the joint, with lancinations and stabbing pains.

Belladonna.—A less violent form of inflammation; the pain is obtuse, heavy and throbbing; after the acute symptoms have been subdued by *Aconite*. *Iodine*, *Ledum*, and *Arnica* are placed in the same category.

Hypericum.—When the pains are severe, and extend to the surrounding tissues; before suppuration sets in. (After suppuration, *Calendula*.)

Ledum.—When the pain and inflammation extends into the surrounding tissues, with considerable fever and frequent chilly sensations.

Sticta pulm.—Acute bursitis, with pain and inflammation. Dr. Price* states that he has treated 25 cases of acute bursitis successfully with the lower potencies of this remedy.

Graphites.—Chronic bursitis, with swelling and redness of the surrounding parts, with itching.

Hepar and **Mercurius.**—When there is a tendency to suppuration. When sharp shooting pains exist *Bryonia* or *Lycopodium* may prove valuable.

If, in spite of the remedies employed, suppuration takes place and the tumor develops in size, it should be opened and the contents discharged. This may be done by the aspirator, a tenotome, or a small trocar and canula. If the tumor is indolent, the practitioner may select different modes of treatment in accordance with the character of the disease. If the sac is thin, the growth recent, it may readily be removed by *Iodine* externally applied, or such internal remedies as have been mentioned. Velpeau's plan of evacuating the contents of the sac and injecting tincture of *Iodine* within has proved successful in my hands. *Hyperdistension* [that is, evacuate the imprisoned fluid by aspiration, throw in an injection of *Calendula* or *Hydrastis*, thoroughly cleanse the inner sac till all pus is removed, then put in a drainage-tube and apply well-regulated pressure] has proved very effective in my hands. A silk seton passed through the centre of the tumor and permitted to remain for several days, is a method of treatment worthy of consideration. If the walls of the cyst are very *thick* and the contents *hard*, the tumor may be dissected out. This is a tedious operation, and is hardly justifiable when other milder and equally curative methods are at hand.

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* Hom. Times, vol. iii., p. 17.

The surgical treatment of bunion is to change the direction of the toe by wearing properly formed boots, and to remedy the faulty position of the toe. This may be effected by dividing the external lateral ligament of the metacarpal articulation, or the tendon of the adductor pollicis, or the inner head of the flexor brevis pollicis; then restore the toe to its position, and retain it for a few days upon an under splint. Pressure upon the bunion may be prevented by wearing over it a circular piece of plaster spread with soap, or a circular ring of felt, perforated in the centre with an aperture corresponding with the size of the tumor. I have used with good success a local application of salycilic acid dissolved in collodion, and applied to the part. I cured a very severe and obstinate case of this disease in a clinic-patient, while attached to the University of Michigan, by the use of the Russian corn remedy (equal parts of Salicylic acid, Ext. Cannabis ind., and Thuja) applied locally. For the internal treatment and other remedial measures, the reader is referred to the preceding paragraph on the treatment of *bursitis*.

INVERTED TOE-NAIL.

BY E. C. FRANKLIN, M.D.

This affection is caused by the ingrowing of the nail into the soft structures of the toe, causing inflammation of the tissues, with a tendency to terminate in ulceration. It is an exceedingly distressing affection, painful and obstinately resistent of either local or internal treatment. It is a disease of purely mechanical origin, and is best cured by the removal of the cause producing it. By the use of ill-fitting shoes, too short for the foot and made too pointed at the toes, the toes are crowded together, override each other, and press unduly against the nail, which is gradually pushed into the soft structures of the toe, causing the disease under consideration. If the ingrowing nail keeps up inflammation, with constant uneasiness and trouble to the patient, the following remedies may be found serviceable in disposing of the results of the inflammatory process: *Aconite*, *Belladonna*, *Rhus*, and *Ruta*, or *Hypericum*, internally and locally. Dr. Hornby reports a severe case cured by Sepia^{30}. The remedies recommended for synovitis may be advantageously consulted for this disease.

The surgical treatment in all severe cases is the course I advise; for, to remove the cause, is to destroy the effect. Let the body of the nail be scraped very thin by a piece of glass, so as to diminish the force of pressure; or a director may be insinuated under the border of the nail which is pressing into the soft parts; lifting up the edge, it is cut off with a pair of scissors. Then apply a minute compress of cotton-wool, having been previously moistened with *Hypericum tinct.*, beneath the adjoining part of the nail, so as to direct the ingrowing point upwards and outwards. As a last resource the removal of a portion of the offending nail may be found necessary.

RACHITIS.

BY E. C. FRANKLIN, M.D.

This is a general disease, wherein nutrition of the whole body is disturbed, natural growth and development arrested, ossification perverted and delayed, and dentition retarded. By reason of these functional derangements the bones become soft, pliable, and yield to pressure. The muscles and ligaments waste, and in many cases derangements of the brain, spleen, liver, and lymphatic glands are produced.

Ætiology.—Rickets is the result of slow impairment of function; it is an affection of early life, and generally shows itself about the period when children begin to walk. It is attributed to improper food, foul air, unhygienic surroundings, want of sunlight, of exercise, of cleanliness. Some children are more readily and more severely affected by these causes than others, for the more the strength of the child is reduced before the actual exciting causes come into play, the more quickly does the patient fall a victim to their effects. All influences which impair the general strength, such as parental infirmities, diseases from which the child may have suffered, difficult dentition, etc., act as predisposing causes of the disease. There is no evidence going to prove that rickets is hereditary, although children of tuberculous, syphilitic, or strumous parents, born and reared under unhygienic conditions, are prone to the invasion of the disease. A very ingenious and learned attempt has recently been made by a distinguished author to prove from morbid anatomy that rickets is a hereditary disease, but all evidences of fact assert the contrary.

Symptoms.—It is rare that rickets occurs without positive premonitions of its approach. The premonitory symptoms will be occasional attacks of vomiting, irregular action of the bowels, profuse sweating of the head, face, and neck, which is most obvious during the day when the child falls asleep. At night he will throw off the bedclothes, even in the coldest weather, and may often be found lying naked. Next, the child will show evidences of peevishness, will cry when he is touched or danced about in the hands of the parent or attendant. Later he will withdraw from the nurse when lifted from the bed, cry when taken by another, as if pressure upon the body caused pain internally. This tenderness on handling the child marks the commencement of the characteristic changes which are beginning in the bones and the nobler organs of the body.

The *actual* symptoms of the disease first manifest themselves by an enlargement of the epiphyses of the long bones, which is most noticeable at prominent and superficial joints, as the knee and elbow. If this symptom appears before attempts at walking have been made, much of the latter deformities of the long bones may be avoided, although the condition of cranio-tabes is more liable to be produced in those who are attacked during the first year of age. If the child has been able to walk, he becomes unsteady on his legs, totters about, or even loses altogether the power of locomotion. The changes effected in the ends of the long bones involve the flat bones also, which become thickened, and the whole leads to the most serious deformity. The little sufferer either sits, or rather leans, quietly all day, sleeping and waking alternately ; at night he moves the head restlessly from side to side, so that the occiput becomes bald from ceaseless rubbing. The flesh is soft, flabby, and of a waxy hue ; the dejections are loose and exceedingly offensive, and abdominal pains of more or less severity prevent sleep ; or, if he sleeps from sheer exhaustion, he is often found in the most uncomfortable positions. During the disease, there is frequently developed a subacute *bronchial catarrh*, the *teeth* are cut tardily, the *fontanelles* close slowly, the *body* emaciates steadily, *curvature of the spine* gradually increases, and the deformities of the chest and extremities become painfully prominent. If the disease begins before the child is able to walk, the deformity of the lower limbs is avoided, but the muscles are thin, weak, and flabby. It was previously supposed that the yielding or bending of the softened bones was caused by muscular force, but it has been satisfactorily demonstrated that these deformities are due to pressure or superincumbent weight. This and the force of gravity are the two chief factors in producing deformity.

The skull is elongated from before backward, the head seems enlarged, while the face is small and disproportioned to the head on account of arrest of development of the facial bones. The teeth, deficient in enamel, decay quickly. The spine is curved from weakness of the muscles and ligaments to retain it in position, and cyphosis becomes so great as to appear like angular curvature. Lateral curvature (scoliosis) is seldom seen in this disease. The chest and pelvis

also undergo deformities of great magnitude; his
limbs, besides being bent, are stunted; the joints
the body is anæmic; the muscles are flabby and
is big; the spleen is enlarged from shallowness of
lent distension; yet, with all these deformities and
children are quiet, and seldom give much trouble

Complications.—Among the chief character
morbid sensitiveness to cold, producing either a
or of the abdomen, which are oftentimes fatal; in
lungs in childhood is always dangerous, as it is a
collapse of the lung; of course, in rickets the cond
intensified. The nervous sensibility of children
is greatly increased; hence the frequent attacks of
lus, convulsions, chronic hydrocephalus, and car
which accompany rachitis and are liable to be in
slightest provocation. Rachitis is mostly met w
exceedingly common in England, and is know
"English disease."

Treatment.—Rickets being essentially the
nutrition, engendered by the anti-hygienic cond
child has been exposed, necessarily the key to t
place, is to change these conditions, to restore the
healthful surroundings, and to select the most dige
diet. These having been arranged, the next im
medical treatment. The remedies best adapted t
process involving the bony structure are the follow
carb., *Brucea*, *Belladonna*, *Calcarea carb.* and *pho*
hydr., *Lactic acid*, *Lycopodium*, *Mezereum*, *Phosphoric*
grav., *Silicea*, *Staphisagria*, *Sulphur*, *Theridion*.

Special Indications.—**Asa fœtida.**—Soft enlargeme
bones. Body bloated; scrofulous, bloated children with gla
accompanied with numbness of affected parts; child screams
and sores of an indolent type, looking bloody, raw, and dark.

Baryta carb.—Imperfect development; child dwarfed
glands indurated; abdomen hard and distended; face puffed;

Belladonna.—Curvature of the lumbar vertebræ. Er
pain in the throat when swallowing Thick, protruding bell
gering; complexion pale, with occasional flushing of heat.

Calcarea carb.—Fontanelles are late closing; dentiti
abdomen bloated and enlarged; extremities deformed; curv
bones bent by walking; white frothy diarrhœa; enlargement

Calcarea phos.—Skull soft and thin, with crackling
delayed closure of fontanelles; sallow, earthy complexion;
dentition; emaciation; lateral curvature; swollen condyles i
bifida; non-union of broken bones; systemic dyscrasias. P
emaciated children; hard lumps of the cranium; diarrhœ
much flatus. Cold tremors; child cannot hold the head upri

Fluoric acid.—Diseases of long bones; weak constitu
emaciation; bony growths on ends of long bones; youthful d

Kali hyd.—Distension of all bone-tissues by interstiti glands; swelling of the bones; hard lumps on the cranium; decaying teeth; tearing, darting pains in all the limbs; jerks or contraction of tendons; great emaciation; tenderness of the entire body; extremely irritable and fretful habit.

Lycopodium.—Glandular swellings; softening of bones; osteocopic pains; the ends of long bones inflamed; emaciation and debility from loss of fluids (China); upper limbs wasted, lower limbs enlarged.

Mezereum.—Bones feel distended; soreness and burning in bones of thorax; bones enlarged, especially their shafts; joints feel bruised, weary, as if they would give way; emaciation of diseased parts.

Lactic acid.—Swelling of articular ends of long bones; enlargement of costal cartilages; diarrhœa and emaciation; bending of the bones; osteomalacia; compact structure of bones thinned; medullary substance has great vascularity. The microscope reveals same appearances as in bones of persons suffering from rickets.

Phosphoric acid.—Pale, sickly look, great debility, tottering gait; interstitial ostitis; exostosis.

Pinus syl.—Scrofulous affections; slowness to acquire use of limbs; weakness of bones

Ruta grav.—Painful joints; contraction of tendons; periostitis; open fontanelles; bones feel as if bruised; sprains.

Silicea.—Head too large for body; emaciation with pale face; ulceration and necrosis of bones; interstitial inflammations; enchondroma; deep-seated pains in bones and joints (ostitis); loss of power in limbs; bending of bones; spinal curvature (cyphosis); bone felons; exostosis; sinus leading to bones. *Hecla lava* follows this remedy well.

Staphisagria.—Black, crumbling teeth; caries of teeth; painful swellings in bones; caries, arthritic nodosities on joints.

Sulphur.—Fontanelles are late in closing; pale, sickly countenance; curvature of spine; softened vertebræ; Pott's disease; youthful dyscrasias.

Theridion.—Scrofulous affections of bones, when all other remedies fail; spinal disease; caries; necrosis; diseases of childhood and youth.

Local Treatment.—The bone deformities may be largely prevented by not allowing the child to walk while the bones are soft. In these cases light, well-padded splints will be advantageous. For the weak ligaments of the joints much benefit will be derived by an appropriate elastic support. Shampooing of the body and frictions along the spine will prove serviceable. The diarrhœa and catarrh can be met by appropriate medicines. A nicely fitting flannel bandage pinned around the abdomen will prevent, to a certain degree, relaxation of the bowels by preventing the too rapid descent of the diaphragm and by diminishing the recession of the chest-walls during the inspiratory efforts. Out-door exercise in a carriage, light mechanical support to the spine, and rest in the recumbent position are important auxiliaries in the treatment. If these mechanical means are insufficient to meet the pressing necessities of the case, the bones may be forcibly restored to their natural positions by the aid of an anæsthetic, or the surgeon may resort to subcutaneous osteotomy.

MORBUS COXARIUS.

BY E. C. FRANKLIN, M.D.

Morbus coxarius, or hip-joint disease, is one of the most intractable, deceptive, and insidious diseases which affect the joints. It has some peculiarities unlike diseases of the articulations in other parts of the body, and, therefore, it should not be accepted as the type of joint affections. These are largely due to the peculiar formation of the bones for moving the hip joint, together with other conditions of which I shall speak hereafter. To arrive at a more perfect understanding of this intricate subject, I shall consider the anatomical relations and structure of this joint.

ANATOMY OF THE HIP JOINT.—The anatomy of the hip joint in early life is somewhat peculiar, and demands careful consideration in order to show the extreme susceptibility in certain cases to hip-joint diseases, both on account of its anatomical as well as its physiological characteristics. First, let me point out the anatomical relations of the acetabulum to the bones in juxtaposition. The acetabulum is a deep cavity, formed by the union of the ilium, ischium, and pubes, and receives into its deep cavity the globular head of the femur by an articulation termed *inarthrodial*, or ball-and-socket joint. It is lined with cartilage throughout, except at the fundus, which is cushioned with fat. This cartilage is divided into three parts, corresponding with the union of the bones forming the joint; these three lines radiate from near the centre of the cavity like the arms of the letter Y. Along these lines enlargement by growth takes place, so that there are six lines which are endowed with distinct and separate activities, the physiological, vital, and assimilative; these functions during growth are in a continual state of hyperæmia, with plastic effusions thrown out for the purpose of preserving, building up, and nourishing these important structures. During fœtal life, from the period of the formation of these bones at the end of the fourth month to birth, the osseous nuclei are in a state of great activity, preparing these structures for the ordinary purposes of locomotion, which are tardy in formation, and rarely attain their maximum of development till near their second, and sometimes their third, year. Besides the cartilage, there is a synovial membrane lining it not unlike the synovial tissue of other joints. The globular head of the femur is likewise covered with cartilage, which is cancellous in structure, quite vascular and, like the cartilage covering, the cavity is in a continual state of hyperæmia and activity, building-up and developing the head, which is very different in the new-born child from the fully formed bone. The head, in proportion to the neck and trochanters, is large, and the peculiarities of relationship are very important and of great value to the practitioner in the proper understanding of the changes which are continually going on within this joint, and which act as a constant predisposition to derangements and disorders of function. The head and neck of the femur are formed, developed, and fully perfected *within* the cavity of the acetabulum and within the synovial membrane, which incloses both the epiphysis and diaphysis of the femoral neck. This shows the great tendency to diseases within this joint, and is very different from the structural arrangement of the knee and ankle joints, for in the ankle joint the epiphysal seams lie outside of the joint. Thus, any injury, morbid action, or inflammatory condition from any cause, which rouses up abnormal excitement in these epiphysial junctions during their period of activities, sets up a disease *within* the joint, not readily discernible except from close study and a knowledge of the existence of these continually predisposing causes.

Besides these conditions, ever ready to take on morbid action, there are five other important ligaments which are interested not only in the formative processes of joint-growth, but which may become interested in the morbid conditions which are set up within the articulation. These are the capsular, the ileo-femoral, the ligamentum teres, the cotyloid, and the transverse. Viewing these structures as a whole, it is easy to see how readily diseases may develop *within* the acetabulum, and how long they may continue in other joints of less causation force when the epiphyseal junctions are *outside* the articulation. To me it is perfectly clear that hip-joint disease, like diseases of the spine which take place between the vertebral cartilages and the bone, from the slightest causes that interfere with activity and growth, is dependent upon a derangement of function and structural growth in the bone and epiphyseal junctions, and is at once reflected as a joint disease.

If we compare the head and neck of the femur of a newly-born child with that of an adult, we will find that the upper extremity of the femur, about the region of the trochanters, is larger than in the adult, the neck is almost entirely wanting, the head is out of proportion to the trochanters and shaft, and altogether it seems like an abnormal femur. It is in the final restoration of the bone, during its growth and development, that diseases of the bone and its structures within the capsule of the joint take place.

I am next led to investigate the pathology of hip-joint disease, and to describe the changes as they occur in the incipiency of the disease, its increase, and final disintegration.

Pathology.—The diagnostic signs of hip disease are divided into separate stages, in accordance with the disturbance of function, its impairment of structure and, finally, its disintegration of tissue. As I have said before, the hip joint is unlike any other articulation of the body, and therefore cannot logically be singled out as a type of the diseases of other joints. The acetabulum is the means of communication through which attachment is made between the largest and strongest limb in the body to the trunk itself. The depression lies deep, and on that account it is almost impossible, in the early stages of hip-joint disease, to detect fluctuation, structural changes, variation of size or shape, etc., such as are quite distinguishable in the more superficial parts of the body. The origin of hip-joint disease has been attributed to various causes, such as derangement of the ligamentum teres, either by increased vascular action, traumatism producing its partial or complete rupture, in inflammation of the Haversian glands, the cartilages of the joint, an affection of the synovial membrane, or a disease of the bone, or a rupture of some of the minute bloodvessels that afford nutrition to the joint. Mr. Barwell is of the opinion that hip-joint disease begins, like other joint diseases, either in the synovial membrane or in the bone, and is opposed to the theory that it originates in the ligaments or cartilages. He asks: "Who has not heard of a hip-joint disease beginning in the round one?" The reason of this preference for, I had almost said superstition about, the ligamentum teres, lies in the fact that it carries the bloodvessels which convey nutrition to the epiphyseal head; therefore, an epiphysitis, a very common event, must of necessity produce hyperæmia of the vessels in the ligament, which is soon followed by inflammation and softening of the whole structure. In the event of primary affection of the round ligament, examination of the bone will not disclose any lesion of bony structure, while, on the contrary, inflammation and degeneration of the head of the femur is always associated with partial or entire disintegration of the ligamentum teres. Between these two alternatives the position must be taken whether the origin of hip-joint disease lies in the bone or in the synovial membrane. Mr. Barwell inclines to the opinion that the bones, from their peculiar relations, are exceedingly apt "to pass from health to disease," as has been already shown while discussing the anatomical conditions of the bones of the joint and their epiphyseal junctions.

It will be remembered that the synovial membrane of the hip joint, unlike that of the knee or elbow joints, is particularly well protected against external violence and alternations of temperature, a frequent cause of morbus coxarius in delicate children and in those of strumous habits; yet it is undoubtedly true that under certain conditions, such as traumatism and excessive fatigue, it has occasionally occurred in youths from ten to fifteen years of age.

Ætiology.—Almost all surgical authorities argue that hip-joint disease is the legacy of a contaminated constitution; that it is especially strumous in its origin, and rarely occurs in strong, robust systems. The phenomena accompanying hip-joint disease vary according to the structures attacked and the activity of the muscular contractions which connect the thigh to the pelvis, which cause the head of the femur to press unduly against the acetabulum at its upper and inner surface, producing an erosion of the surfaces in constant contact, whether they be cartilaginous, synovial, or epiphyseal. This is the beginning of the pathological processes which so frequently occupy the upper segment of the cotyloid cavity and the corresponding portion of the head of the femur, and which is produced by the neuro-muscular movements above referred to. The cavity of the acetabulum is prolonged upwards and inwards by the continued muscular pressure, and the accompanying ulcerative absorption ensues, and there is produced "an osteophytic growth of bone forming a rough lip to the new cavity, according to the law of increased growth and induration beyond the focus of a suppurative inflammation."

Pain in the knee, one of the trophic symptoms of hip disease, has been referred to various causes, such as irritation of the obturator nerve; to a continuity of the inflammation along the aponeurosis of the rectus muscle; to propagation of the inflammation along the medullary canal to the lower end of the bone; to spasms of psoas and iliacus internus muscles, and, finally, to sympathetic action kept up between the two extremities of the bone by the irritation of nerve trunks passing in close contiguity and supplying both articulations. It will be remembered that the sciatic gives off a branch to the hip, and two or three small twigs to the knee joint. The anterior crural also gives off branches to both of these joints, but the obturator is believed to be, above all the others, the principal factor in the production of this peculiar phenomenon.

Barwell, from frequent observations, has pointed out this significant fact that there are "two sorts of knee pain: one is situated in a nerve, therefore is connected with inflamed synovial membrane of the hip; the other pain, with ostitis of the head of the femur. Both may be somewhat early in reference to other symptoms, but the latter form, if hip disease commences in the thigh bone, is very early; it occasionally antedates all other symptoms, save perhaps a slight limp."

Fixation of the thigh upon the pelvis is another of the very early symptoms of hip disease, and is caused by continued contraction of those muscles immediately connected with the capsule of the joint. This fixedness, slight at first, increases gradually, flexion and abduction being prominent in the beginning, which continues for a greater or less length of time, when abduction changes into adduction, the flexed position remaining. These changes in the position of the limb have been referred to distension of the capsule, which determines the stage of the disease. Thus, in the stage of flexion and abduction, the progress of disease is less advanced than in that of flexion and adduction, the first representing the beginning of the first stage of the disease, or the obtuse angle lengthening; the second, the termination of the first stage, or the acute angle shortening.

The lengthening of the limb is the effect of two conditions:* abduction of the hip, and the necessity of maintaining a certain parallelism of the limbs while the angle of the abduction remains the same. The posture of the patient created by the abduction necessitates, of course, abduction of the sound limb to an extent nearly equal to the former, which causes the lumbar spine to be curv abducted, side.

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* Barwell on Hip-Joint Disease.

The causation of the shortening is also produce of the limb which makes an acute angle with t axis. This posture is caused by the pelvis bei eased side, carrying with it the acetabulum, an lifting up the pelvic plane and giving the limb th ening. This elevation of the limb produces an of the trochanter, and can be distinctly seen in conditions continuing, the constant pressure exer planes favors ulcerative action, which in time le structure and dislocation of the caput femoris, pa

Besides the causes before mentioned, Mr. Barwe and, as he claims, a potent causation force in i congenital phimosis. A statistical table is give the "condition of the prepuce in one hundred ca boys under ten years of age."

In the *first degree* there were thirty-nine cases in the prepuce was of the size of a pin-hole, so t part of the glans, or only a minute portion of the be seen. In the *second degree* there were twenty- all, or a considerable portion, of the urethral ori ered. In the *third degree* there were seventeen ca puce, when retracted, uncovered some small porti the *fourth degree* there were eleven cases in whic puce projected more than a quarter of an inch b was capable of being entirely retracted. In the only six cases in which the structures were nor ingly interesting, as proving the causation force it is furthermore stated that in the "Evelina Hospi is largely patronized by Jews, *few* children are a case. Mr. Barwell argues that the relation exist ease and phimosed children, or rather, the infl are these: "that phimosed children have facile long-continued priapism; that this condition, un must produce, after a time, a certain irritabilit lumbar spinal cord; that from this part the v pelvis and lower limb are given off; that the inf tation on the trophic nerves is well known, and t ticular period large trophic changes are in pro joint."

I have frequently treated cases of hip diseas produced by vaginal irritation through the prese rectum, or by abnormalities existing in the genit

Symptoms.—There are three stages, or peri action, corresponding with three stages of inflammation as they occur in other parts of the system: *First*, The stage of *vascular excitement*, before the period of effusion has taken place. *Second*, The stage of *effusion*, and before the period of disintegration. *Third*, The stage of *true inflammation*, with all its attendant changes and phenomena.

FIRST STAGE.—The symptoms are not clearly defined, and are reflective or trophic; there is awkwardness of gait; perhaps a trifling pain referred to the knee; shuffling walk; dragging of the foot, with limping gait; easily fatigued; when standing, patient rests weight of the limb upon the toes; stiffness of the joint, first observed in the morning when the patient first moves the limb; improves from exercise, after which he stands upon the sound leg for the purpose of relieving the affected one; reflex pains increase with increase of the disease; is affected by weather; neuralgia frequently sets in, which comes on in violent paroxysms.

If the patient is examined at the latter part of this stage in a nude state, standing directly in front of you, his back towards you, the sound leg will make a solid column to bear the weight of the body, and to avoid concussion upon the diseased structures within the joint the leg will be slightly flexed and a little abducted, but the feet do not lose their parallelism; the natis on the affected side is a little flattened, drops a little, and the gluteo-femoral crease is slightly enlarged from disuse; there is more or less rigidity of the iliacus internus, psoas magnus, or the abductors of the thigh. To detect the muscular rigidity, the patient should be placed upon his back upon a *firm* flat table, with the pelvis and trunk upon the same plane; now lift the thighs gently till the vertebræ touch this plane throughout its entire extent, then draw a line from one anterior spinous process to the other, and another from the centre of the sternum, bisecting the umbilicus to the centre of the pubis; now bring down the limbs, first, the suspected one to the plane of the table, and if the popliteal space touches the plane perfectly, there is no disease within the joint; if, on the contrary, the pelvis tilts upwards when this motion is being made, there *is* disease considerably advanced within the joint. This arching of the spine is therefore an important symptom. The lines made upon the body will also show marked deviation while these movements are being made. Abduction, adduction, and rotation of the limb will also become symptoms of some value, for with these motions the pelvis will be observed to move with the limb when carried beyond a certain point. Atrophy of the limb will be developed, which can be detected by comparing the two limbs together.

SECOND STAGE.—In this stage all the phenomena of inflammation will be increased; the parts are swollen; the peculiar position of the limb, to relieve pressure within, gives the foot an *everted* look; the leg and thigh are more flexed; the obliteration of the gluteo-femoral crease more marked, and the entire limb is more prominently abducted; the tilting of the pelvis, to escape pressure within the joint, gives the appearance of "apparent lengthening;" reflex pains increase in severity as the disease progresses; pains now begin to be referred to the joint; joint becomes very sensitive; tumefaction of the internal and external surfaces of the hip; pressing upon the great trochanter aggravates pain; so does concussion upon the heel; spasmodic action of the ligaments of the hip and leg also exists.

Physical signs are a change in the shape and size of the nates; wasting of the glands; flattening of the posterior fold of the buttock; change of the gluteo-femoral crease from transverse to perpendicular shape; the body is supported by the sound limb; constitutional disturbances become prominent, with feverishness and thirst; crying of the child at night during sleep from spasmodic contraction of the adductors which brings the diseased surfaces together with a thud.

THIRD STAGE.—Symptoms of the second stage are intensely aggravated; the parts increase in swelling by pressure of pus upon the inflamed and highly sensitive structures; percussion gives fluctuation; rupture of the capsule takes place, or the acetabulum is perforated, and the imprisoned contents escape into the surrounding tissues; then pain is relieved, and all the characters of the limb are changed; the limb is now adducted, inverted, and flexed at the hip only; the pelvis is raised upon the affected side and projects backwards, and the gluteal fold is higher than upon the sound side, and the general position of the limb is the reverse of its position in the second stage.

DIFFERENTIATION OF SYMPTOMS IN THE FIRST, SECOND, AND THIRD STAGES.

In the first stage there is a certain limping movement, sometimes intermittent, and often persistent; tenderness of the joint, with intermittent pains in the knee-joint, in the thigh, or over the dorsum ilii; there is also a fixedness of the joint, the child seeming rather to drag than lift the foot, the body being slowly inclined to the sound side; a peculiarity of this limping is this: there is considerable lameness in the morning, which seems to improve under exercise during the middle of the day, and gets worse towards evening when the painfulness becomes quite marked.

SECOND STAGE.	THIRD STAGE.
Limb apparently lengthened.	Limb, first, apparently; second, actually shorter.
Limb abducted, everted, and flexed in both joints.	Limb adducted, inverted, and flexed in the hip-joint only.
Foot touches the ground with sole.	Foot touches with ball only.
Toes everted as in fracture of the neck of the femur.	Toes inverted as in posterior superior luxation.

SECOND STAGE.	THIRD STAGE.
Pelvis lower on diseased side.	Pelvis raised on diseased side.
Pelvis projected forward.	Pelvis projected backward.
Pelvis angle of inclination acute.	Pelvic angle of inclination almost right.
Nates low and flat.	Nates high and round.
Linea glutea inclined *toward* affected side.	Linea glutea deviates *from* affected side.
Pain most intense.	Pain greatly diminished.
Fluctuation positive.	Fluctuation removed.
Wasting of the limb known by measurement only.	Wasting of the limb detected by the eye.
Pain and tenderness at its height.	Pain and tenderness much less marked.
Temperature increases from 100° to 102°.	Temperature decreases and falls below 101°.
Swelling about the hip-joint and perinæum.	Swelling diminished about the hip and perinæum.

If the disease is not cured in the first stage by appropriate treatment, every effort should be made to overcome it in the first half of the second stage and before the period of effusion, for it is seldom that a patient is cured in the latter part of the second, or in the early part of the third, stage without an operation.

A large number of cases of hip disease, by careful and persistent treatment, do get well without dislocation or diastasis, even after the shortening has continued for a long time. This recovery, however, is not permanent, for in a few weeks, by inattention or through indifference of treatment, the child will relapse, the old pain return, fever set in, abscesses will break out anew, from which the child may either recover under proper treatment or gradually sink away, a victim to the dreaded ravages of inflammatory action and its disintegrating processes. Therefore, I place much stress upon a continuation of treatment, until both local disease and constitutional cachexy shall have entirely subsided for a couple of months.

Treatment.—The treatment of this disease is medical, mechanical, and operative. In the first stage of the disease cures are often effected by combining with the indicated remedies a proper degree of rest, continued long enough to overcome the local trouble without deranging the health, as in almost all of these cases the general condition is largely at fault, and imprisoned rest, long continued, will have a serious effect upon the constitution. It is seldom, however, in hospital practice that these cases come under the care of the practitioner until the beginning of the second stage, or even at its termination in effusion and consequent disintegration. In civil practice better results follow the treatment of hip disease, for the reason that they soon fall under the notice of the practitioner; it is in the earlier stages that these diseases are the more readily cured. The proper guide for the medical attendant to follow is the increased or diminished pain and thigh

stiffness. If this gradually improves, we mus
rest and internal and local treatment; but if t
obtains and the system seems to suffer under
indulgent method of treatment must be permitt
patient out for a ride daily, or a lounge placed
weather permits, where the child can get better
everything should be done in a hygienic, diete
that will arouse the latent forces of the system t
dition. As a rule, the first stage is the period for
medication, and the second stage for these an
sion.

I have divided the remedies for hip disease a
to one or the other of the three stages. The m
first stage are Aconite, Belladonna, Calcarea carb
Phytolacca, Rhus tox.

For the *second* stage, Arsenic, Bryonia, Colo
iod., Mercurius, Phosphorus, Rhus, Staphisa
nium, Hepar sulph., Sulphur.

For the *third* stage, Arsenicum, Calcarea pho
Colocynthis, Kali carb., Lycopodium, Phosphor

Aconite in the beginning of the disease, with full puls
great restlessness with thirst; dryness of the mouth; the
cervical nerve; tearing, drawing pains; in the formative
disease, so that no other remedy is required.

Belladonna.—Burning stinging pain in the joint;
mildest pressure: sudden appearance and disappearance o
and leg feel weak and lame, with tensive pain and pressu
and stiffness in the articulation, with indisposition to walk,
swelling and sensation of heat over the hip joint; pains w
evening, and when in a warm room; tendency to congestio
parts, drowsiness, or inability to go to sleep; disposition to

Calcarea carb.—In the first stage, when there e
cachexia; in cases where the disease moves along slowly;
than shifting; increased at the slightest movement and dimi
ness in the hip and thigh; limping gait; walking on the tip
and mornings, from change in the weather; better by wa
bed; in children of large head, open fontanelles, pale, wa
hard and bloated, with inclination to diarrhœa. In the se
increased from slightest movement, relieved by rest; pains
the joint; the disease is the result of injury occurring in a

Lachesis, in any stage, if the aggravation occurs ever
an aggravation of general malaise after sleep; a notable
discharges, even of a natural consistence; previous abuse
lacerating pains in the hip; a sensation of drawing in the
sion in the leg as if it were too short; lacerating pains in t
ing of the joint; great weariness in walking; in the last
taken place, when the sinuses look of a dark bluish color.

Mercurius.—In the first and second stage; worse
inclination to sweat: tearing pain in the hip joint, worse
stiff when walking; involuntary twitching of the limbs;
bruised; sweats much from slight exertion; pain always
cachectic system; cramplike position of the toes.

Phytolacca.—Sharp, cutting, drawing pains in h touch the floor; heavy dragging pains from hip to knee; hip disease after Mercury, or in syphilitic children.

Rhus tox.—In the first and second stages; pain in hip joint on pressing upon the trochanter; pain in the knee, and worse at night, or from over-exertion; involuntary limping; spasmodic pains in the limb when stepping out; worse from cold or damp weather; stiffness and lameness in the joint when quiet, disappearing after moderate motion; pain in the joints worse on entering room from the open air; sensitiveness to cold, open air; evening fever with diarrhœa; bruised and drawing pains in the thigh.

Arsenicum.—In the second stage, when the child is emaciated, restless, and exhausted; constant thirst for small quantities of water during febrile action; pain back of great trochanter extending down the thigh posteriorly; pain somewhat relieved by flexing the knee; in irritations of the alimentary canal, with general depression; derangement of the nervous system; debility with general sinking of strength; lancinating pains in the hips, thighs, and groins.

Bryonia.—Stitchings in the hip joint, like needles, piercing the part; drawing in lower limbs; lancinating pains from the hip to the knee; lacerations in the thighs on movement; in chronic inflammations of the joint-structures: great stiffness in all the joints, in the forenoon rather than the afternoon; pains aggravated in a warm room; aggravation from evening till midnight.

Colocynthis.—Pain in the joint as if screwed in a vice; lancinating pains from the hip to the knee; in the stage of irritation of the structures of the joint.

Iodum.—Sharp, tearing, intermittent pains in the acetabulum, increased by movement of the joint.

Calcarea phos. in the third stage, to limit suppuration and the destruction of bone, and to promote new organizations; stinging, itching, burning pains in small spots; sore pain in the hip joints; in scrofulous and cachetic children.

Hepar sulph. in the third stage, in strumous patient, where the suppurative process has not been arrested by the Mercury or where suppuration seems inevitable; to hasten the formation of abscesses; buttock and posterior thighs painful when sitting; caries of the hip joint.

Carbo veg. in excessive prostration in the third stage; the ulcers have a livid appearance and emit a fetid color, ichorous, offensive, blackish discharge; great prostration of the whole system.

Kali carb. in the third stage, with crampy, tearing pains in the hip; a feeling of bruised pain in the joint; twitchings of the muscles of the thigh; dull pain in the side of the knee when walking, and especially when extending the limb; great tendency to start, especially when touched.

Phosphorus in the third stage, fistulous ulcers, with callous edges, secreting a thin, foul pus; wounds and areolæ livid and blue, and bleeding at the slightest touch; hectic fever

Silicea, in the third stage, with suppuration and caries of the bones; fistulous openings discharge a thin, fetid pus with bony fragments forcing their way out; pale, earthy complexion; glandular swelling; every little sore is apt to suppurate and form new sinuses.

Sulphur, in all stages in psoric persons or persons of cachetic constitutions.

If the patient does not endure well the recumbent or sitting position, splints may be employed which, while they will permit motion, at the same time keep up extension. The most important of these are the splints of Davis, Thomas, Taylor, Sayre, Knight, and Shaffer, or Barwell's. Attention must be given to dietetic and hygienic influences; sea-bathing, sunlight, and fresh air.

For operative procedures and details of mechanical treatment, consult works on Surgery.

CURVATURES OF THE SPIN

BY E. C. FRANKLIN, M.D.

Curvature of the spine, or deflection of the ver all times largely attracted both professional and Mr. Pott first described the nature of the disease for its cure.

From the earliest piece of mechanism devised eased vertebræ to the modern, efficient, and cur by Prof. L. A. Sayre, and others who have imb special interest, this department of chirurgery ha appreciation of the medical profession.

To substitute an artificial leg for a natural one restoring this important organ of locomotion, bu to make good a defect which otherwise would le helpless cripple.

The return of a hernial tumor, and its retent mechanism, saves a ruptured person from the d carceration or strangulation, meanwhile affor opportunity of usefulness to his family, and th good in the social and business activities of life.

These are achievements worthy the high and the surgeon, but how much more so is the relief extensive deformities of the spine which not on the ordinary duties of life, but create a constar and mental suffering, embittering life and depri all the enjoyments of society!

In the present epoch, the relief of these defor *specialty*, and like all of its kindred departme subject of special consideration, has advanced w than ever before. It is singular that the earliest worn by woman to beautify and grace the form of deformity of her sex than any other cause. of high-heel shoes and the extravagant extent carried in the late preposterous fashion, "The G resulted in many spinal deformities, and hundreds more had it not been succeeded by antithesis of the former, the evil effects of "Th antagonized by another set of muscles which b sation overcame the injurious effects of the first.

When we observe the beauty, the grace, and t mony of movements which mark the normal s of muscles acting in various directions to give to this flexuous column, firm and elastic, light mingled together into one grand whole a combination of mechanical properties that the utmost human ingenuity has in vain attempted to imitate. The involuntary effort of all these muscles lying on either side of the spine and extending beyond to distant structures is to preserve and harmonize the natural functions of the spine and adapt it to the varied movements of the body.

Ætiology.—If the various sets of muscles act in harmony, there can be no permanent curvation; if on the contrary, from disease, traumatism, or constitutional impairment, the equilibrium between them is lost, then begins the first cause of spinal deformity. The effort of nature to preserve, as best she can, the proper adaptation of the mental globe to the bony column upon which it rests, is the secondary curve, or the curve of compensation. The great principle taught by this brief exposition of the genesis of spinal curvatures is this, that there cannot be an arc of incurvation without the secondary curve of compensation, which furnishes the only true basis of successful treatment of spinal curvatures.

When the muscles act in harmony, the different groups being properly set off by their respective antagonists, the spinal column, at rest or in motion, is always in its proper position. But, if the action of these groups of muscles is not in proper antagonism, harmony and coördination are lost, and the spine makes its continuous and increasing flexion *towards* the point where there is the strongest muscular action. This increased tonicity establishes the *first arc* of incurvation, and the compensatory curves are the result of this continuous muscular contractility in the effort to rectify the evils arising from the primary deflection. The importance, therefore, of ascertaining which of the curves is the original one is so great that without this knowledge the surgeon will not be able successfully to combat the deformity. It is the pathological state of the *first* arc or curve to which all treatment should be directed, and it is chiefly due to the want of proper knowledge in this direction that so many failures have followed the best directed efforts of the practitioner in the proper restitution of these deformities, progressive ataxia of the opposing muscles going on till the most serious consequences have been developed.

CAUSES OF SPINAL CURVATURE.—The causes of spinal curvature are both *local* and *constitutional*, and as one or the other of these causes may predominate, so the cases admit of being arranged in the following classes, viz.: 1st, Constitutional predisposition or systemic cachexia. 2d, Muscular contractions produced by some exciting cause. 3d, Frequent curvations of the spine in the same direction. 4th, Loss of equilibrium between spinal resistance and superincumbent weight. 5th, Pathological curvation.

To him who contemplates spinal curvature as an *effect* alone, it seems a matter of trifling importance; but to one who studies the internal functional activities which have been aroused, the physiological agencies which have been interrupted in their harmonious coördination, it becomes one of the deepest problems to be solved. We are only on the threshold of knowledge so far as the internal activities of this deformity are concerned. In studying the anatomy of spinal curvature, we are surprised to find so little to guide us in the regional mechanism of the spine as influenced by muscular action. We cannot be benefited by viewing the spine as an inanimate curve made up of several pieces; we must consider it as it is, a living, functional organism, or rather a series of separate organisms, with living structures between them, and surrounded by muscular appendages of highly endowed activities; on one side we have functionally weakened muscles, and on the other structurally changed muscles, both requiring treatment, yet each requiring it in a different way, and each set demanding the peculiar adaptation of remedies to meet its own diseased condition. We know what produces functionally weakened muscles and also structural shortening in muscular tissue, both gained by study and observation in analogous parts of the body, and our deductions must be made accordingly, in their application to lateral curvature.

LATERAL CURVATURE OF THE SPINE.

Symptoms.—One of the early symptoms of lateral curvature is an undue prominence of one of the scapulæ. Whenever this condition is presented, the whole length of the column should be examined in the following manner: Have the patient entirely denuded of his clothing, and stand him up, his back toward you, and leaning well forward: now firmly press your finger slowly along the whole length of the vertebral column, beginning at the uppermost cervical vertebra and continuing downward to the extremity of the sacrum. The pressure produces an excitement of the skin along the whole length of the spine, presenting a *reddish* line. Or, in doubtful cases, touch the extremity of each spinous process with a pencil dipped in black ink: the appearance of the inked line will demonstrate the existence of curvature, if any exist. The existence of a curvature, even in its earlier stages, may usually be detected by placing your hands in the axillæ and lifting the patient forcibly upwards. The weight of the head and shoulders will be removed from the spinal column, the curvature entirely disappearing, to be renewed again as soon as the force is withdrawn. Or, if the patient be extended upon a table, face downward, the spine, if not assuming an almost straight line, can be made to do so by a slight extensive force.

Ætiology.—Of the ætiology of lateral curvature little is known. The antero-posterior curvatures, Pott's disease, and the conditions which cause them, are better understood, and are attributed to concussions and traumatisms of various kinds and severity, the injury exciting disturbances in the cartilaginous disks and vertebræ, and thus disturbing some centre of ossification to such an extent as to induce inflammatory disturbances in ossification, and to result first in disintegration of the soft, then the bony structures. In lateral curvature the condition is different. We know deformity exists, and that by preference the right side is mostly affected, and we recognize certain nervous states, either hysterical or emotional, which accompany this deformity. These nerve disturbances are classified according to Barwell "as spastic contractions, debility, and paralysis of respiratory muscles, overaction of the right arm, uneven distribution of the weight of the trunk, the weight of the heart hanging on the dorsal, that of the liver on the lumbar spine, disease and deformation of the vertebræ and invertebral substance," which I cannot accept in their entirety. The relation of all these and other assignable causes to the pathological lesion produced is at present in the darkness of unknowledge. When we see lateral curvature existing and progressing in infants from six months to eight years of age; when we see sexual development, and the physiological in good function while the deformity increases, and when we see the left curvature sometimes existing with no other cause than an accidental one; when we see it occurring in boys of tender age, and yet under the most searching symptomatology can detect no relation between the physiological and pathological conditions, how are we to determine what the coincidental relation is, as the determining factor or factors in the existence and direction of the curve?

While I believe that the hysterical or emotional state is the predisposing condition to the development of lateral curvature, yet there must exist the exciting or causation influence for its absolute pathological evolvement. This may be produced by various physical or dynamic influences, such as injuries and other traumatic agencies, or mental and nervous excitations of different degrees of severity. We all recognize the mental precocity in children afflicted with scrofula and the strumous diseases incident to such organisms, yet all children who are precocious are not necessarily scrofulous, nor are those who are hysterical or emotional always the subject of lateral curvature.

We must look beyond these conditions to find the true factor or causation theory; nor can we find it altogether in malposition alone. When a limb has become shortened by a pathological state of the hip-joint, or when the arrest of development in children of tender growth has caused infantile paralysis, there is produced a lumbo-dorsal curve from sympathetic irritation which disappears when the patient lies down; yet instances are seen when these conditions just given have been curative of lateral curvature. Here are causation forces producing a certain pathological state, and the same state cured by the same or like forces under dissimilar circumstances. From this we glean two authenticated facts; first, that the nerve irritations in the one case will produce pathological action to such a degree as to induce lateral curvature; second, that true lateral curvature is not associated with unequal length of the lower limbs alone, thereby proving that malposition of itself is not altogether a factor in producing *scoliosis.*

We see, therefore, that there are two causes required to produce the curvation, the *predisposing* and the *exciting.* The *exciting* causes, under certain conditions, may give rise to curvature without the intervention of the predisposing; and the predisposition, if intensified, will permit the formation of curvature, although the exciting causes are so slight as not to be recognizable. This is effected by irritation of the spinal muscles and vertebral structures, which, continuing to act, give rise to impairment of function and subsequent debility, which in time disenables them to retain the spine in its proper position for a great length of time. The condition of the bones themselves will determine the question of slow or more rapid formation of these curvations, as, in the case of rachitis, the bones, being soft and more pliable, yield with far less reluctance than when they are normal in texture. In scrofulous constitutions, also, there exists a predisposition to bony impairment, and on this account they are more readily influenced by any muscular irritation which may exist in any portion of the spinal groups.

It is a well-known fact that children who grow rapidly increase in development at the expense of the bone elements of the body, and no set of bones feels this draught upon its functional activities more than the vertebræ, and none yield quicker to this deterioration of vital force than the bones of the spinal column. The liability of women to lateral curvature may be referred to this natural delicacy of bone formation as one of the predisposing causes, and their sedentary habits and frequently constrained positions with ribs of steel and stays of bone, which foolishly indulgent mothers permit, in opposition to the laws of health and functional activity.

If the muscles of the back are not rested when put in continued awkward position by change of posture, the spine, in its deflection to one side or the other, is supported almost entirely by the articular processes. These frequent pressures, usually on the same side, soon affect the functional activities of the soft-growing spine, derangement of tissue results, and there is produced, in a very small spot, perhaps, the altered condition which gives rise to curvation, and which, once established, goes on with persistent development till a full and complete curve is formed. Other causes, such as the awkward position of standing or leaning to one side, and the unsightly straight-back seats or chairs in the lecture and recitation rooms of our colleges and universities, are potent causes of incipient lateral curvature which should be antagonized by well-directed exercise in a gymnasium. I hold it as a rule that any educational institution which compels its students to occupy such constrained and injurious positions should erect a gymnasium upon the theory of muscular compensation. Young men and women are not much benefited by walking, even at great distances, or riding in the purest air in stately carriages, or occupying constrained seats in buggies; infinitely more benefit may be procured by the varied muscular and joint exercises which belong to a properly conducted gymnasium.

Exciting Causes.—These are the conditions which directly affect the functions of the spinal structures, which, being continued for a length of time, disturb the nutritive processes, thereby directly causing spinal curvatures; or the exciting cause, acting with more severity and force, often acts immediately, and with as much certainty as in the former instance. Under the head of these exciting causes may be mentioned the following: 1st. Inequality of weight of the two sides of the body, as in the case of a lost arm, or in the habit of carrying weights always on the same side, or the continual or frequent playing of croquet, when the bending of the body is all to one side. 2d. Inequality in length of the lower extremities, which produces obliquity of the pelvis and, consequently, of the spinal column. 3d. Disease or injury, causing one side of the thorax and abdomen to be continually contracted laterally. 4th. Deformity of the head, where it is thrown to one side, as in wry-neck or cicatricial contraction caused by burns. 5th. Faulty positions of the body, such as the bad habit of always standing upon one leg; the twisting or bending of the body, as in writing upon a too low desk, or any other evil position of the body, either while engaged in work, reading or writing, when the mind is intensely occupied, the careless habit of standing at the desk, or sitting in school upon stools or seats without backs.

After explaining the causes which are almost continually at work to produce lateral curvature, I will explain the phenomena of these deformities as they affect the spinal column.

1st. Curvature of the spine is mostly to the right side, and sometimes included in this deformity there is a rotation of the vertebræ upon each other, the rotation being always *towards* the convexity of the curve.

2d. There is more or less deformity of the scapula, the one on the side of the convexity being further removed from the spinous processes than its fellow. There also exists an undue prominence of the lower angle of the scapula on the convex side of the curve. These can be traced to the altered relations of the ribs, which are twisted in an abnormal position by the rotation of the vertebræ, those on the concave side being relaxed and attenuated, while those on the convex side are made more prominent.

Various positions, with intervals of muscular exercise, may be beneficial; but the fact is, these patients rarely fall into the hands of the surgeon until the period has passed when they can be made of essential importance.

As measures of hygiene, those exercises, free when the heart and muscles act in unison, are the early stages of this disease the employme which most effectually develop and equalize mu use of internal remedies, may often accomplish cure. Calisthenics, gymnastics, etc., are of gr beneficial are those free, active agents, or agre may be obtained by tumbling, rolling, and r air.

Good wholesome food, irradiation, friction, water applied to the spine alternately, bathin excursions out, besides these, the general healt and by constitutional remedies, change of air, systematic use of those measures conducive to the digestive and assimilative system, great bene

The pernicious use of *blisters, setons, issues, cou* serious and irreparable harm by their irritating a and especially if they are long continued. I h effects of these irritating substances applied alo an extent as to seriously impair the functions of ing tissues, and in every case where they have be inform me, and the history of the patients pro effect evil, but the curvature progresses more r sanative treatment.

Under properly directed homœopathic treatm tained and assisted in its efforts to overcome which are slowly deranging the muscular forces and undermining the constitution. It tends to ened forces of the system, locally and generally, field of curative action than by any other know ing this hitherto intractable disorder, and the br ing its use fully attests the value of this valuabl tem of practice.

3d. Actual atrophy of the mammary gland on *nent scapula*, the convex or paretic side, which *the primary curve* is in the dorsal region.

4th. *The lateral dorsal curve* is a more rigid *lumbar or cervical*, and is associated with dis *cular action*, which is one of the chief causes wh *or restriction* while this rigid, intrinsic muscular *This intrinsic force* is absolute, and cannot be m *diate cause*, either by mechanical effort improp or chloroform, its effects being prominently displayed on the *concave* side of the deformity.

5th. A compensatory curve always exists after the arc of incurvation, or primary curve, is fairly developed; the primary curve is the rigid or pathological curve, and the compensatory, the yielding or physiological; hence we find no true rotation at these curves of compensation.

6th. After the rigid or pathological curve has been established for any considerable time, the long muscles of the back, the semi-spinalis, spinalis and longissimus dorsi, under anæsthesia, show a structurally shortened condition. Now, if we examine the cadaver of a patient who has died of lateral curvature or the complications that attend it, we will find a wedging together of the articular processes on the concave side of the curve, and well-marked evidences of degeneration in both the intrinsic and extrinsic sets of muscles. There is no disease of the bodies, laminæ, processes, or ligaments of the vertebræ. The osseous lesion lies wholly at the articular processes, and no other lesion exists. I ask, to what is this lesion due, and is it primary or secondary?

If *primary*, there is a direct cause of the rigidity; but how shall we account for the extent of the curve and its progressive character, or the *anchylosis* of the vertebral bodies? Again, to what shall we attribute the atrophy of the mammary gland which is on the *opposite* side?

If it is *secondary*, it is much more easily understood, and we refer the curvation to a rigidity, a unilateral contraction of the *intrinsic* muscles (those immediately connected with the spinal processes and bodies of the vertebræ) producing paresis and, ultimately, loss of power (paralysis) of the antagonistic muscles. There is either an essential loss of power in the antagonistic muscles, or an exalted state of the shortened or contracted muscles, for both conditions, exaltation *first*, with increasing contraction, a hyperæsthesia of the muscular fibres, with subsequent paralysis and the varied trophic symptoms following. All these symptoms show that there is disturbed muscular action throughout, and disprove the fallacy that the right side of the spine is stronger than the opposite. There is a *contracted* state of muscles on the shortened side, and a *lengthening* of those muscles on the opposite, or enfeebled, side.

I shall divide lateral curvature into five kinds:

1st. True lateral curvature with rotation.

2d. The false or hysteric curve, which simulates the first.

3d. The strictly compensatory curve, due to an altered plane of the pelvis.

4th. The curvatures which result from acute unilateral pneumonia or pleural inflammation.

5th. The forcible curve which results from infantile paralysis affecting certain spinal muscles. In the last three curvatures there is disturbance of extrinsic muscular action, and, as a rule, they take place, producing little true change of the pelvic plane, except when standing or walking. They entirely disappear when the patient lies down, and the history of the case points to the cause in operation.

The curvature produced by infantile paralysis is of easy diagnosis, and in this, like the others, the extrinsic muscles are actively engaged and cause the deformity. The age at which it occurs, the rapidity of its growth, and the degree of the resulting deformity, all point to muscular contraction of the extrinsic muscles as a principal factor in producing the disease.

Treatment of Lateral Curvature.—The principles of treatment in spinal diseases are the same as are recommended in all diseases of the articulations, namely: rest of the part affected, and the cure of the morbific agencies connected therewith by such internal remedies as are homœopathic to the diseased state. The two agencies required to effect this result are the mechanical and the medicinal. Medicinal agents in advanced stages of true lateral curvature will effect little or nothing without mechanical means, and the latter will not prove curative without the assistance of the former. Both must be maintained at the same time to effect the most beneficial results.

There are many kinds of mechanical means in use to effect the desired result, but with one or two exceptions they are inadequate to meet the indications of efficient treatment. The great majority of these appliances are constructed for the purpose of effecting restitution by padded crutches under the axilla; others are made to oppose the increasing deformity by directly resisting the pathologic curve, neither of which have any real curative agency in restoring impaired muscles or in overcoming the disease. The various modern appliances, such as the rawhide and dextrine jacket, the hammock suspension, the porous felt jacket, the ingenious device of hospital steward Marshal, the silicate-of-soda corset, the liquid-glue jacket, and the plaster-of-Paris cast, and other adaptations of questionable utility, have been carefully examined, and in some cases actually tested. The result is, that among those who are the most familiar and successful in the treatment of these curvatures, no expedients yet known supersede the use of the plaster-of-Paris vest, and I can confidently state that in my hands it has proved the very best means of curing true spinal curvature of which I have any knowledge. I do not think that any one who is really familiar with all the rectifying agencies of the plaster vest would, for a moment, yield its superior virtues to any other known appliance. I have applied this vest over a thousand times, and I am more and more persuaded that it is the best, the most humane, and the most successful in its results of all the mechanical contrivances that were ever invented.

I will admit that it is the most difficult of all mechanical agents to apply; and to apply it rightly is one of the most exact and artistic processes of modern surgery. My success in the proper application of this vest did not meet my highest expectations of its grand and recreative principles till I had "put up" at least one hundred cases, and I can assure my readers that in no other mechanical adaptation does frequent practice lead to so much superiority as in the application of this vest.

In my spinal clinics in St. Louis, as well as in the University of Michigan, I have undertaken the cure of desperate and unpromising cases, and never have I been foiled either in greatly benefiting or in restoring altogether such patients when I could entirely control them.

The special means of treatment are *local applications*, *rest*, *mechanical extension*, *massage*, *muscular exercises*, and mechanical support and pressure.

Local applications applied to the back, by friction, cold and hot and medicated lotions applied alternately; rubbing, etc., will oftentimes produce benefit, especially in cases where there is loss of muscular tonicity and a tendency to paresis.

Veratrine and Plumbum are our very best remedies in the restoration of the contraction of muscles produced by the lateral spinal curve. Its effect upon depressed muscular structure is beneficial according to the conditions which govern momentarily the excitability and especially the muscular inelasticity. It may be applied *locally* by uniting it with vaseline, and rubbing the part covering the morbidly excited muscles once or twice a day; or it may be internally used, but I prefer the former mode of applying it.

Rest should be taken in a horizontal position upon a couch, after sufficient and regular exercise has been had for restoration of the physical powers. When not reclining, the patient should rest in a chair so formed as to fit into the natural lumbar curve of the back; this attitude prevents the subsidence of the spine, and holds up the shoulders, and tends to bring the dorsal muscles into play with benefit to the patient.

Mechanical extension is properly comprised under the heads of those contrivances which are employed for restitution of the spine and overcoming the deformity. They have been already enumerated under the mechanical agencies recommended to overcome spinal deformities.

Massage.—This is one of the recent improvements in surgery, and is employed for the purpose of stimulating and restoring impaired functional activity, and to establish tonicity in the extrinsic muscles of the back. It consists of a series of rubbings and pressures systematically and regularly performed upon the devitalized muscular structure, and corresponds with the system of shampooing employed by barbers. I have found it beneficial in many cases.

Muscular exercises are employed for two-fold purposes, viz., to invigorate debilitated muscles, and to overcome the deformity of curvature.

The exercises which have already been described for direct action upon the curves, have been, to a large extent, improperly employed, as muscular exercises in which the arm of the affected side is on a plane higher than the other, have the tendency to increase rather than diminish the concave side of the curve, for the reason that the muscles upon that side are brought into greater action than those of the opposite side. Hence the action of the muscles being continued in this direction will increase the concave side of the curve, and at the same time more fully develop the arc of the curvature, and correspondingly increase the deformity. The principle of this muscular exercise is to shorten the curves upon their convexities, and in cases of rotation of the spine to bring back the vertebræ to their proper position; variations must be made in these exercises adapted to the various forms of curvature, to suit the peculiarities of each case, and general exercise of the erector spinæ muscles of both sides should be carried out in addition to the other exercises named.

Mechanical Support.—If improvement is not satisfactory under the various kinds of muscular exercise recommended, recourse should be had to some mechanical appliance, which, while it sustains the position of the patient in as normal a position as possible, should permit free use of the muscles during ordinary occupations. This appliance should always be adapted by the surgeon himself, and not be left to any one who is not thoroughly posted in the use of the mechanism to be employed. I have elsewhere referred to the different kinds of mechanism which I believe to be the most advantageous and beneficial, and having tried almost all of these ingenious contrivances, I willingly turn to my appliance of *[illegible]*, and find relief in all cases when properly adjusted. This is either the plaster-vest of my own improved method, or the silicate-of-soda jacket. The former I prefer in most cases, and unhesitatingly apply it when I find myself confronted by cases which have resisted all previous efforts.

Constitutional Treatment.—Internal treatment should be especially directed towards the patient's general health, with the view of removing the constitutional dyscrasia that exists, and upon which the local disease often depends. Thus, if the pathological condition depends upon a scrofulous, tubercular, or syphilitic taint, the duty of the surgeon is to rectify if possible the constitutional tendency by those remedies which are specifically adapted to the one or the other of these deranged conditions. If the disease depends upon scrofulosis, remedies which act upon the processes of digestion and assimilation, improving their tone and vigor, are the most appropriate. If syphilitic complication is a cause of impairment of the vital forces, those measures are to be employed which assist in completely eradicating the poison from the system.

If the patient is a woman, attention must be given to the condition of the uterine functions, and all irregularities be promptly corrected. The mammary glands are also to be protected from pressure by the vest when applied.

Therapeutic Hints.—**Asa fœtida.**—For caries in scrofulous subjects; after the abuse of mercury; ulcers with edges highly inflamed, accompanied by great sensitiveness; pus very thin, profuse, and offensive.

Angustura v.—When sensations of jerking and twitching are felt along the spine like electric shocks.

Apis mel.—Bruised feeling in the lower portion of the dorsal or lumbar region; inability to sit down without increasing the pains in the lumbar and sacral regions; sensation of prostration; cannot grasp anything with certainty of holding it; paralysis and emaciation of the upper and lower limbs.

Arsenicum.—Greatly oppressed breathing and anxiety; constriction and tightness of the chest, as if bound with a hoop; weariness in all the limbs; twitchings; tremblings and violent startings.

Belladonna.—Severe cramps in the small of the back; lancinations from without inwards in the vertebræ, resembling stabs with a knife; fainting fits; furious delirium, with dilated pupils; labored breathing. Patient worse in the afternoon and night.

Calcarea c.—Stinging and cutting pains; can scarcely rise from his seat after sitting awhile; nausea, with bloating of the abdomen; weakness and emaciation; easily tired by bodily exertions, even by talking; leucophlegmatic temperament in fair, plump children; disinclination for work; peevish and restless mood, with anxiety and palpitation of the heart; swelling of the cervical glands; swelling and incurvation of cervical and dorsal vertebræ; drawing pain between the scapulæ; sinuses extending to the spine.

Calcarea phos.—Cramp-like pain in the neck; pains and aches between the scapulæ; backache and pains in the lumbar region; curvature of spine in the lumbar region; abscess near the lumbar region; tabes mesenterica; rachitis; open fontanelles; flabby, emaciated, shrunken children; disposition to furuncles and ulcers; peevish and fretful children, worse from bodily exertion; worse in the open air.

Cimicifuga.—Spinal irritation connected with uterine troubles; great pain in lumbar region; general twitchings of the spine; pains of the muscles of one side of the back, following spinal curvature; cramps of the cervical muscles on moving the head; sensitiveness of the spine in the cervical and dorsal regions; soreness of all the spinal muscles; severe pains in the back, shooting down the thighs and through the hips; violent aching in the small of the back; twitching of the spinal muscles producing curvature; alternate tonic and clonic spasms.

Gelsemium.—In the early stages of the spinal trouble; weakness from exhaustion; confusion of the head; paresis of tongue and glottis; muscles feel bruised and will not obey the will; loss of voluntary motion; irritation of the spine; spinal exhaustion and pain along the vertebræ; posterior spinal sclerosis; paralysis of the muscles of the spine.

Ignatia.—Hyperæsthesia of the muscles of the back; spinal irritation, with reflex symptoms in every direction; hysterical manifestations; lancinating pains in the back and neck; spinal disease with gressus gallinaceus; pain in the back, increased from slight touch; pain along the back in small circumscribed spots; great sensitiveness to a draught of air; especially suited to nervous and hysterical women of mild but easily excited nature; decreased sexual power.

Mercurius.—Griping pains in small of back; bruised pains in whole of back;

partial sclerosis of the spinal cord; rheumatic stiffness of the back and neck; stinging pains in the small of the back with sensation of weakness; violent pains in the spine, worse from motion; tearing pains in the coccyx; bruised sensation in the back and loins; blood coagulates easily, with congestion of the capillaries; diseases of the vertebræ with suppuration, especially if too profuse; emaciation with night-sweats, which give no relief; great weakness, with tremblings from the least exertion; pains worse at night in the warm bed.

Phosphorus.—Pain in the back as if it were broken; paralytic weakness of the small of the back; sick and paralytic feeling along the spine; spinous processes of the vertebræ are very sensitive to touch, also the muscles on either side of the spinous processes; pain in small of the back when rising from a stooping position; burning in a small spot in the small of the back, better from rubbing; softening of the spine; progressive locomotor ataxia; pain in the coccyx, followed by pains in the cervical region; over-sensitiveness to external impressions; spasms of muscles on paralyzed side; formication and tearing in the muscles of the back. It has been asserted by Danillo "that large doses of Phosphorus produce central myelitis and extravasations along the whole length of the spinal cord; whilst smaller doses produce diffused myelitis, involving both white and gray matter. The morbid, nervous phenomena observed in phosphorus poisoning may be referred to one or other of these forms of myelitis. In acute phosphorus-poisoning, hæmorrhages occur in the central nervous system."

Rhus tox.—Numbness and stiffness of the muscles of the spine; inflammation of the spinal membranes; pains in the small of the back, better when lying upon something hard; curvature of the dorsal vertebræ; spinal muscles painfully stiff and lame, with tearing, tingling, and numbness; right-sided hemiplegia; soreness and stiffness, worse on beginning to move, and better from continued motion; fatigues easily, and requires to rest again; intolerable itching of the skin.

Silicea.—Lameness of the back; sensation of weakness and paralysis, with pressure and tension, especially when touched; violent spasmodic pains along the back; inflamed psoas abscess; severe pains in the vertebræ, increased by pressure; heaviness in the lower limbs; faulty nutrition in lymphatic-sanguine temperament; spinal paresis, with tenderness of the surface; constant aching in centre of spine; spinal irritation; spinal curvature to the right; aching, beating, throbbing in lumbar region; paralytic symptoms proceeding from the back; sense of great debility; wants to lie down; child slow in learning to walk; progressive locomotor ataxia.

Secale cor.—Tenderness of the lower dorsal and upper lumbar spinous processes; gentle creeping sensation in the back, with tingling, extending to the fingers and toes; pains in the lumbar region; "kink" in the back; spinal diseases with gressus vaccinus; pressure upon the affected part causes pain in the part as well as through the chest; aggravation from every exertion or strain upon the spine; hyperæsthesia of the spine, with tenderness all along the column; lateral curvature in dorsal region.

Hypericum.—Spinal irritation, with tenderness from the cervical vertebræ to the sacrum; frequent attacks of pain along the back following an injury to the spine; aching pain and sensation of lameness in small of the back; after a fall, slightest motion of arms or neck extorts cries; consequences of a spinal concussion.

Physostigma.—Congestive state of spinal cord with paralysis; stiffness of neck, with feeling and drawing of tension; weak back, unable to stand erect; pain with sense of stiffness running down the spine; inclination to bend the head forward (anterior and posterior curvature); difficulty of sitting erect; limbs weary, as if after great fatigue.

Zincum.—Spinal irritation, with pains only while sitting; violent, long-lasting, aching pains in lumbar vertebræ, worse sitting; burning pains along the whole spine; stiffness and tension of the neck; tearing pains; twitchings along the muscles of the spine; tension between shoulder-blades; paralysis of the spine, with capillary congestion; debility of the muscles of the back.

Consult also: Aurum, Agaricus, Agnus castus, China, Calcarea iodat., Carbolic acid, Cuprum, Hepar sulph., Lachesis, Lycopodium, Naja tripudians, Mezereum, Natrum muriat., Nux vom., Pulsatilla, Staphisagria, Sulphur.

ANTERO-POSTERIOR CURVATURE, OR POTT'S DISEASE—TUBERCULOSIS OF THE SPINE, ETC.

Ætiology.—In a large variety of cases of this disease its history and progress furnish sufficient evidence upon which to base a correct diagnosis. As a rule, it occurs in delicate, scrofulous children, is developed early in life, and, in a large proportion of cases, is met with before the sixth year.

Its origin has been attributed to injuries received even weeks or months before the appearance of the disease, but I do not believe that these causes will produce the disorder independent of tuberculous predisposition or constitutional impairment. In most cases antero-posterior curvature is first developed in the inter-articular fibro-cartilages; in others the primary lesion is said to exist as a tuberculous deposit in the cancellous structure of the bodies of the vertebræ. In either case there is a gradual absorption and disintegration of structure, until at length the affected vertebra is reduced to a mere shell, with perforated and crumbling walls, and it is crushed beneath the weight of the superincumbent column. As a result of the inflammatory process, caries takes place, and abscesses, as a consequence, develop sooner or later. It has been observed that in rare cases patients have recovered without any evidences of the existence of matter; and autopsies have demonstrated the fact that a large portion of the vertebræ have been destroyed without giving evidence of the existence of pus. *Functional* disturbance may exist in the ossific or soft structures for a considerable length of time before the attention of the surgeon is called to the real condition of the disease, and in some cases the bones have been partially destroyed and distortion decidedly marked before a correct diagnosis was formed. In all cases of spinal irritation or injury done to the spinal column, it is the duty of the surgeon to make a careful and critical examination, so as to detect the disease before any great inroad has been made in the spine or in the patient's health. When the disease has progressed to such an extent that inflammatory softening and disintegration of the osseous structure exists, the weight of the superincumbent body pressing upon the inflamed and degenerated tissues will produce absorption, which affects more the anterior portions of the vertebral bodies than the posterior. This diseased force continuing to act, absorbs more and more of the spine-structure, the contiguous bodies fall together, and give to the spinous processes the peculiar angular appearance presented in such cases. When the disease commences in the bony structure, primary necrosis takes place in one or more of the vertebral bodies, as is seen in other situations where cancellous bone-structure exists in large masses. In a later stage the cartilaginous, ligamentous, and osseous structures are all involved in the degenerative process, and a chasm is formed in the ante-

[illegible] part of the spinal column, which [illegible] giving rise to anterior or posterior spinal curva[illegible] the direction taken. If the disease begins in [illegible] angular projection is more marked than in [illegible] lumbar.

The disease occurs more frequently during [illegible] occasionally met with in adult life, when it [illegible] traced to direct injuries. The evidence of [illegible] easily obtained when the disease occurs in [illegible] occasionally we find this kind of curvature developing in younger children whose family history is good [illegible] been affected with any previous illness. [illegible] inflammatory trouble may occur in any part of [illegible] the bodies of them [illegible] as we leave [illegible] [illegible] upwards. They are preceded by the [illegible] tory action, local pain, tenderness, and [illegible] of the spinous processes, accompanied by [illegible] easily [illegible], thickenings and formation of [illegible] then an abscess and fistulous openings.

When the disease invades the cervical verte[illegible] [illegible] the pus usually presses [illegible] pharynx, forming a post-pharyngeal abscess. [illegible] downwards between the oesophagus and verte[illegible] the posterior mediastinal space. Pus occurrin[illegible] and dorsal vertebrae generally takes the same d[illegible] it reaches the sheath of the psoas muscle and [illegible] abscess.

Cervical and dorsal abscesses may open into [illegible] with all the [illegible] the results that [illegible] this cond[illegible] also point in the same direction.

Symptoms.—As before stated, this disease [illegible] and it is sometimes observed before the child [illegible] indication in these cases being a slight projecti[illegible] processes, either of the dorsal or upper lumb[illegible] examination shows a slight lateral curvature. [illegible] fulness involving two or more spinous pro[illegible] more acute angular projection. In an older [illegible] learned to walk, it will be noticed that he trip[illegible] his feet drag, and are not properly raised in w[illegible] turned in slightly, producing a shuffling gait; [illegible] projection, and the accompanying pains in the [illegible] domen, with spasmodic contractions of the mu[illegible] *lessness, fever, and fretfulness.*

As the disease progresses, the adjacent vert[illegible] with projection of their corresponding spinal p[illegible] region invaded an abrupt angular prominence. The system now begins to show suffering, the appetite is poor, breathing is difficult, the bowels are constipated, abdomen swollen, and the urine pale and alkalescent. The gait and general appearance of the patient at this stage are characteristic of the disease.

He walks with his head, shoulders, and pelvis thrown back, and slides rather than walks, for fear of the pain inflicted by the quick movement of walking.

When standing, he will be found resting his body upon his knees, or leaning against a table. If you ask the little sufferer to pick up a pin or other substance lying on the floor, he will not bend over, as ordinarily done, but will get in that position which will serve to lift the weight of the head and shoulders from the spine; this will be effected by squatting down and picking up the object by a sliding motion.

In the earlier stages of the disease the pressure made by the spinal processes upon the nerves as they make their exit from the whole length of the spinal cord, produces evidences of disturbed function at their distal extremities.

If the disease is situated in the *cervical* region there is a constrained and fixed position of the head to avoid pain on motion, the patient will complain of choking, difficulty in swallowing, unpleasant sensation about the larynx, pain in the thorax, and cough, long before actual deformity occurs. In the absence of lung, cerebral, heart, or throat difficulties of sufficient importance to develop these symptoms, it is the duty of the surgeon to make a thorough examination of the spine to ascertain the actual morbid condition of the spinal column. The child finds it difficult to keep the head in the erect position, supports the chin by the hands, the elbows resting on a chair or table.

In disease of the *dorsal* region, the patient will suffer from the effects of injury done to the nerves which supply the contents of the thorax and upper portion of the abdomen; motion in any direction is limited, local pain and pain on percussion are often present. The patient moves slowly and cautiously, and sits with the arms extended, the hands resting on a chair to relieve weight and pressure.

There will be felt a sense of constriction as of a band encircling the body. The heart will perhaps be functionally disturbed, with furtive pains in the lungs and pericardial region. The stomach will be disturbed, with flatulence, gastric pains, and more or less evidences of indigestion, with constipation. The stooping position, bending forwards to put on stockings or lacing boot, lifting a light weight from the ground, going up or down stairs, rising suddenly from the horizontal to the sitting or standing position, especially in the morning, any attempt to twist the body round suddenly when lying down, are all characterized by pain. In fact, any movement which brings the psoas muscles into play is difficult to be borne.

The evidences of the disease being situated in the lower dorsal or lumbar region are irritations about the bladder and rectum, with streaking pains down the thighs, or a frequent desire to void the urine, with contractions of the flexor muscles of the thigh. When such symptoms exist independent of any well-recognized disease, always examine the points where the spinal nerves make their exit from the vertebral column, and carefully search for any tender or sore spots in their vicinity.

In the early stages of the disease the muscles are contracted by reflex irritations, which affect to a considerable degree the appearance and action of the child.

Throughout the whole case it will be observed that all the movements of the child are so directed that the least possible motion shall be given to the spine. "Every joint of the lower extremities is bent for the purpose of preventing concussion from affecting the bodies of the vertebræ. The chin is made to project, the shoulders become elevated, and it is impossible for the child to stand upright and receive any concussion whatever which may be communicated to the bodies of the bones without suffering pain. The muscles of the back are held rigid in order to prevent any movements of the bodies of the vertebræ upon each other." The patient, if young, cries from very slight causes, either mental or physical, has an anxious expression of countenance, and moves the body with that care and caution which indicate pain and sensitiveness; he breathes short, a long breath producing pain. Some patients walk more than naturally erect, sliding the feet upon the floor rather than lifting them; the arms and shoulders are sometimes thrown back to save the muscular effort necessary to keep the body erect, for as the disease advances, difficulty of maintaining the trunk upright increases. Any concussion of the spine, by sitting down suddenly, riding, or walking, causes the child to express painful emotions. At night it will oftentimes cry out with pain, yet not be able to describe its exact location. As a rule, the pain will lead the surgeon to the point affected either directly or through nervous reflections.

EXAMINATION OF THE SPINE.—After stripping the child and laying him across your lap, face downward, with the arms over one thigh and the legs over the other, gradually separate your thighs, and you will almost uniformly observe that the child gives a long-drawn sigh of relief, a full inspiration, and a complete expiration. So long as the child is held in this position he will breathe easier and fuller, if the extension is not carried so far as to produce reflex muscular contraction. By this mechanical process, the nerves supplying the lungs and interior parts of the thorax are relieved of all pressure, and the muscles of all irritation. Now gradually close your thighs, and the muscles will again resume their contractility, the child breathing short and quick as before.

When the extension is removed, there will be more or less spasmodic action in all parts of the body; spasms of the extremities may be developed at pleasure by placing one hand upon the head and the other over the bottom of the sacrum, and pushing the bodies of the vertebræ together, if the disease be situated in the anterior part of the vertebral bodies. If the affection involves the sides of the vertebræ at their junction with the ribs, pressure upon the spine may not produce pain, and even percussion may fail in eliciting pain, but if pressure is applied so that the heads of the ribs are made to impinge upon the vertebral facets, pain will be immediately experienced, and by separate pressure upon the ribs the precise point of the disease can be detected.

The absence of pain on pressure over the spinous processes of the vertebræ is regarded by some as a proof that no disease of the bones is present, but it should be remembered that in affections of the anterior portion of the spine, especially when disintegration takes place, pressure removes the contact of the diseased bones, and therefore relieves rather than inflicts pain. In obscure cases, when nothing definite can be learned by manipulation, the application of ice, intense heat, or the electro-magnetic battery to the spine may be employed.

The ice, or heat, moving gently along the spine, produces no effect until it comes in contact with the diseased spot, when pain and even a spasm will be developed.

By these processes, and that of Dr. Seguin's delicate surface thermometer, which will show an elevation of temperature over the inflamed part, we are enabled to detect spinal disease when all other manipulations fail. As has been before observed, it is one of the most important considerations to arrive at a correct diagnosis in any variety of incipient spinal disease before deformity appears, as upon an early recognition of the disease depends its most successful and speedy cure. I have had under treatment a case in which cervical curvature was preceded by a dry, hacking cough which withstood the action of every remedy. The persistence of the cough aroused the fears of the parents, and the child was brought to me for examination, when I detected incipient cervical curvature. The cough entirely disappeared after the treatment was entered into for spinal curvature. In this case the persistent and racking cough was the only discernible symptom that called my attention to the real state of the disease.

PARALYSIS, complete or partial, is sometimes the result of spinal tuberculosis, and is dependent upon: 1. *Direct* pressure on the cord by effusion into the spinal canal, or by encroachment on the cord by a diminished calibre of the bony canal. 2. Pressure on the nerve filaments issuing from it by protruding vertebræ. 3. Hyperæmia, irritation, or inflammation communicated to the membranes, or the cord itself, from the diseased surrounding bones.

The degree of paralysis is by no means dependent upon the amount of deformity. The paralysis may be of greater or less extent according to the region of the spine affected and the amount of irritation extended to the cord from disease of the surrounding bones.

The extent of paralysis varies according to the part of the spine affected, and with the amount of irritation propagated to the cord from the disease of the surrounding bones. Thus, if the projection takes place in the lumbar region, paralysis of the lower extremities only will probably occur. If the disease is in the dorsal region and severe, the sphincter muscles run a great risk of being affected. The upper extremities have been occasionally paralyzed by extensive disease in the cervical region; but these are far less liable to be affected than the lower extremities.

Again, the effect of irritation of the anterior columns of the cord will be to diminish or destroy the power of voluntary motion, and less frequently that of sensation, while affections of the posterior columns will cause similar destructive results on the reflex function of the same part. The majority of those cases of paralysis resulting from spinal irritation dependent upon tuberculosis, in which reflex action is undiminished while voluntary motion and even sensation are impaired, is accounted for by the fact that the bodies of the vertebræ being alone affected by the diseased process, the anterior columns of the cord will be the ones evidently affected, while the posterior, except in rare cases, will remain unharmed. Paralysis from *pressure* is diagnosticated by a lax and flabby state of the muscles, that from *irritation* being followed by a tense and rigid condition.

Duration and Termination.—The progress of Pott's disease of the spine is extremely variable, but, as a rule, angular curvature is produced within a period of time ranging from six to twelve months. If the disease advances favorably without terminating in abscess or paralysis, it will be arrested by the process of bony anchylosis in six or eight years, depending upon the amount of constitutional resistance. If abscess and paralysis supervene, the period of recovery will be prolonged to five and, in rare cases, to seven years.

In the incomplete form of paralysis which sometimes occurs in these cases, recovery usually takes place in two or three years, but when the disease does not terminate favorably in true anchylosis, death is the result of abscess, paralysis with meningitis and inflammatory softening of the cord. The mortality in children under allopathic practice is about 5 per cent. and in adults about 20 per cent. Under homœopathic practice, the statistics, as compiled from the most accurate sources, give us in children a mortality of a little less than 3 per cent. and in adults about 12 per cent.

Prognosis.—The prognosis in Pott's disease of the spine is much more favorable in children than in adults under both systems of practice, but in both it will be unfavorable in proportion to the rapidity with which the disease progresses and the extent of constitutional contamination. Children who contract this disease and are born of parents of tubercular family history, succumb to the ravages of the disease much more rapidly than those of ordinarily good constitution.

Treatment.—The treatment of this disease must be both *constitutional* and *local.* The importance of *constitutional* treatment hinges on the fact that in the large number of patients in whom the affection occurs, struma or a cachectic habit of the system is almost invariably present.

The *local* treatment varies much according to the age of the patient, the region of the spine in which the disease is situated, and the length of time the disease existed.

In the *first stage*, and previous to the appearance of any deformity, rest, the massage treatment, local applications, the galvano-faradic battery, and mechanical appliances are the means to be relied upon for a cure.

In the *second stage*, when angular curvation is developed, in addition to the means already advised, recourse must be had to the plaster-vest and the artificial spine. The expectation of good results from the "*absolute recumbent* position" upon which so much stress is laid by some writers, is barren of success, from reasons that must be obvious to every specialist of intelligence. If the child is able to walk at all, never mind how imperfectly, the rationale of treatment is to relieve the spinal irritation, invigorate the system, and take off the pressure from the diseased vertebræ.

The spinal column being composed of a congeries of bones jointed together by their bodies and arches, it is obvious that its diseases must be similar to diseases of joints rather than to bone affections; therefore its treatment must be conducted on similar principles to those guiding us in the treatment of joint affections. The great principles to be followed are, to separate the diseased surfaces and to keep them at rest in this separated position. The only kind of apparatus to accomplish this result is that apparatus which will enable us to lift the superincumbent weight from the bodies of the vertebræ and place it upon the oblique articular processes, thereby separating the diseased processes from continual irritating contact. By this process we restore the spine, remove irritation, and prevent diseased action.

Dr. Davis says: "When the weight of the superincumbent portion of the body is thrown upon the healthy oblique processes of the spine, we have a natural articular support, and the diseased vertebral bodies are separated from each other. This separation relieves the patient from all *suffering*, according to the law discovered, and made known to the profession, by us, viz.: that the pain and irritation, arising from ulcerated joints, was owing principally to pressure upon the diseased surfaces, said pressure being produced by the contraction of muscles passing over said joint."

"When these diseased surfaces are separated, there is no pressure or friction to prevent their healing, whereas before, the pressure interrupted nutrition, as strangulation from other cause, while every motion of the parts upon each other brought the cancellated structure together like two millstones, grinding and destroying each other. The avoiding of this result is the reason why a patient can withstand this disease, and recover in shorter time than when not subjected to this mode of treatment."

The many kinds of apparatus in general use to effect this purpose, that of substituting the oblique articular processes for the vertebral bodies, to support the head and trunk, do so by means of *counter-pressure alone*, thereby making them sustain a weight much greater than that which nature intended them to bear. Now, while it is true that they are of firmer texture than the bodies, it is also certain that this unnatural weight will in time be the cause of their disintegration. In addition to this, their surfaces being so oblique, a greater part of the weight must fall upon their ligaments, causing their relaxation, and thus permitting the processes to slip by one another, distorting the articulation, and diminishing the height of the patient.

These evils can only be removed by employing two forces in lieu of one, viz.: *counter-extension*, or *suspension*, and *counter-pressure* at a point at right angles with the spinal axis which is vastly inferior to the first.

Dr. Benjamin Lee, of Philadelphia, was the first to call the attention of the profession to successes in this direction by the employment of suspension. He devised, partly in imitation of Prof. Mitchell, of Philadelphia, and partly acting upon a hint contained in a little German work by Dr. Nitzsche, a spinal swing, somewhat similar to the one employed by the author, by which the patient is suspended from the floor, making the entire weight of the body below the diseased portion of the spine the extending force.

The advantages of the mechanical treatment in these affections, by combining instruments for extension and pressure, over that consisting of confinement in the horizontal posture, and the establishment of exhausting, painful, and loathsome discharges, are incalculable.

The constitutional treatment will depend upon the systemic peculiarities of each case. Based upon a strumous or tuberculous diathesis, in connection with the constitutional and mechanical treatment, every therapeutical and hygienic measure should be adopted that will invigorate the general health and improve the system.

The old principle of imprisoned rest in the prone or supine position for any length of time cannot be too severely reprobated. The only rest required is a rest of the part affected, which may be procured by proper mechanical appliances, while healthful exercise, pure air, hygienic and therapeutic measures, will help to restore the shattered organism, and assist the mechanical treatment in overcoming the disease.

The appliances should be made as light as is compatible with strength, and should fit closely and firmly to the body to insure support and steadiness; they should be so adjusted as to make pressure always in an *upward* direction, for the purpose of taking off the superincumbent weight from the diseased vertebræ; also, to apply light pressure on *either side of the spinal processes* so as to relieve pain, and prevent ulceration or excoriation of the external tissues.

As measures of hygiene, those exercises in which the heart and muscles act in unison, are of great value. Calisthenics, gymnastics, etc. are of value, but most beneficial are those agreeable exercises which may be obtained by tumbling, rolling, and rollicking in the open air, or systematically conducted muscular exercises.

Good wholesome food, massage, faradization, frictions, cold water and salt water bathings, are all important accessories, but besides these the general health demands attention, and by constitutional remedies, change of air, and the diligent and systematic employment of those measures conducive to the improvement of the digestive and assimilative system, great benefit may be derived.

For the purpose of relieving the vertebral bodies of the weight of the head and shoulders, a variety of mechanical appliances or braces have been devised; they are all made to conform to the same general principles, their object being to transfer the weight of the column from the bodies of the vertebræ to the oblique processes, these having a denser structure, and being more able to bear pressure without injury. The great majority of these appliances are constructed with the idea of accomplishing this result by padded crutches under the armpits. It is impossible by this means to restore the spinal deformity to its proper contour, as the scapulæ possess such mobility that the shoulders are lifted upwards without removing the pressure from the diseased spine, the result being an elongation of the muscles between the trunk and the scapulæ, with a relaxation of the muscular structure of the neck and upper portion of the spinal column, without giving real relief to the patient.

The fact that these deformities are never seen among that class of persons who carry weights on their heads, or who indulge in a full development of their muscles, leads me to recommend the general employment of well-directed physical training in our colleges, schools, and seminaries of learning, and especially is it advised in our female

academies. The best mechanical appliance for
plaster-of-Paris vest.*

Preparatory to the application of the plaster ve
exercising the muscles of the back, and to assist
the deformed spine, I have been in the habit of p
daily in the suspensory apparatus for the period
according to the condition of the patient and the

A closely fitting woollen shirt, either woven o
patient, pulled down tightly over the hips and *held*
the plaster roller, to prevent its wrinkling and co
the skin. The patient is then put in the suspensory
in a state of *extension* or *elongation*, the roller ba
loosely woven cloth (cross-barred muslin is th
having been previously saturated and its mesh
with plaster of Paris, dextrine, starch, or any ot
will retain its form, and become firmer and stro
tion, are then carried around the *crests of the ilia*,
roller to the contour of this portion of the body,
necessary to complete a strong and immovable s
dressings.

This I have denominated my *artificial sacrum*
apparatus or artificial spine rests; for, as the na
foundation of the normal spine, so the artificia
support to the artificial spine.

After allowing this to become partially hard a
be carried around the body, encircling the entire
of the ilia to the axillæ, making a solid parietal s

The artificial spine, my improvement of Say
employed at present, consists of two pieces of n
fourths of an inch in width, and long enough
artificial sacrum to a point above the distorted p

The lower extremities of these two pieces of ir
angles to the perpendicular bars, or another rod
moulded over the sacral plane foundation, extend
wards to be closely adapted to the crests of th
To this flat foundation bar are fixed rougher
enough to extend from the upper part of the ch
and, bending under it, are turned upwards upon t
against the previously dried jacket. This is to
connection with the fenestrated ribs, to the artific
is to be suspended the superincumbent weight of
diseased spine is at rest and undergoing the proc
repair.

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* For an extended description and application of this ves
the author's monograph on Spinal Curvatures.

The upright pieces, connected at their upper extremities by two horizontal cross-bars, are about three inches apart, lie on either side of the jacketed spine, and are so tempered that they may be closely fitted to the contour of the external dressings. Three roughened perforated tin strips, about an inch wide, and of sufficient length to encompass the trunk, are riveted to this frame-work, to answer the purpose of artificial ribs.

This, when laid upon the foundation jacket, corresponding, as it does, to the natural spine and ribs, is to be firmly and evenly covered up by frequent turns of the plastered roller, carried upwards and downwards, until it is strongly and securely held in position.

From the upper circular portion of this iron framework, a steel bar extends upwards, having two screws at its extremity placed one and a half inches apart, to which is fastened, by means of two corresponding slots about one inch in length, a second bar that curves over the head to the upper part and centre of the vertex. By this arrangement of the two bars they can be lengthened or shortened at will, and after rightly adjusting the movable bar, and then securing it by screws, we have a firm and strong support, extending from the artificial sacrum upwards above the vertex, from which the head and shoulders can be suspended.

To the second bar is attached a small cross-piece, playing upon a pivot, to which occipito-mental straps are fastened for suspending the head.

This may be effected also by means of plaster-strips attached to the upper portion of the thorax, and carried *over* the shoulders and down the back, and of sufficient length to form a loop to fasten to the upper portion of the second bar.

When all are carefully and securely applied, the occipito-mental straps are attached to the circular cross-bar, care being taken that the pressure upon the chin be not so great as to create abrasions upon the tender cuticle of children. To prevent this, I would recommend that the parts subject to pressure be washed daily with a mixture of Arnica tincture and water, of the proportion of one part of the former to four of the latter. A daily application of this solution will prevent the tendency to abrasion of the sensitive skin in children so as not to interfere with the constant and continued use of the apparatus.

In order to keep up a more continuous and gradual extension, I have substituted an elastic band, or, rather, introduced an elastic mento-occipital apparatus, in lieu of the unyielding leather straps of Prof. Sayre, the elasticity being proportioned to the age and size of the child, which is intended to imitate, as nearly as possible, the springiness of the intervertebral cartilages in the natural state.

Constitutional Treatment.—Internal treatment should be especially directed toward the patient's general health, with a view toward removing the constitutional dyscrasia which exists, and upon which the local disease often depends. If the patient is a female, attention must be given to the condition of the uterine functions, and any irregularity promptly corrected. The mammæ are also to be protected from over-pressure.

Therapeutics.—**Asa fœtida.**—Caries in scrofulous subjects; after the abuse of mercury; ulcers, with edges highly inflamed, accompanied by great sensitiveness; pus very thin, profuse, and very offensive.

Belladonna.—Severe cramps in the small of the back; lancinations, from without inwards, in the vertebræ, resembling stabs with a knife; fainting fits; furious delirium, with dilated pupils; labored breathing. Patient is worse in the afternoon, evening, or at night.

Calcarea carb.—Stinging and cutting pains; can scarcely rise from his seat after having been seated; sickness at stomach, and great weakness. Easily tired by bodily exertions; talking makes him weak; emaciation more or less apparent. Worse in the morning; also in the open air, and in wet weather.

Lachesis.—Luxative pain in small of back, as from too great exertion, with awkward, tottering gait, and jerks, taking away the breath.

Angustura vera.—When sensations of jerking and twitching are felt along the spine like electric shocks.

Apis mel.—Bruised feeling in the lower portion of the dorsal or lumbar region, inability to sit down without increasing the pains in the lumbar and sacral regions; sensation of prostration; cannot grasp anything with certainty of holding it; paralysis and emaciation of upper and lower limbs.

Arsenicum.—Greatly oppressed breathing and anxiety; constriction and tightness of chest as if bound with a hoop; weariness in all the limbs; twitchings, tremblings, and violent startings.

Kalmia.—Constant pains in spine, worse in the loins; great heat and burning sensation as if the spine would break from within outward; itching across the loins; feeling of paralysis in sacrum; pains increased in bed; weakness and paralytic feeling of the limbs, with heaviness of head.

Gelsemium in the early stage of spinal trouble; weakness from exhaustion; confusion of head; sight dim, pain on moving the eyes; dull expression of face; paresis of tongue and glottis; incontinence of urine; muscles feel bruised and will not obey the will; loss of voluntary motion.

Graphites.—Tremor over the whole body; weakness in back and loins when walking; heaviness in legs; numbness of left hand with sense of formication extending up the arms, which fall asleep; general weakness and prostration.

Cimicifuga.—Spinal irritation connected with uterine troubles, great pain in lumbar region; severe infra-mammary pain; chorea and general twitchings of the muscles.

Ignatia.—Hyperæsthesia with exalted mental condition; hysterical manifestations: lancinating pains in back and neck.

China.—Loss of animal fluids; constant complaints of weak back; great dizziness, with roaring in the ears.

Nux vom.—Patients who use sewing machines; confinement to the house; bowels constipated; great pain in small of the back with constant dull frontal headache; gastric troubles; ineffectual attempts to urinate or defecate.

Cocculus.—Relieves ailments increased by passive motion.

Conium.—Worn-out persons; dizziness with tendency to fall to the left; worse when turning in bed.

Mercurius.—Griping pains in small of back; bruised pains in whole of back; sinking, with an indescribable malaise of body and mind; paroxysms of spasmodic contractions in the limbs; copious perspiration at night, from which no relief is obtained. Worse on getting warm in bed.

Mezereum.—Mercurial poisonings; rheumatic pains between shoulder-blades, preventing motion; limbs feel as if shortened. Worse from touch or motion; relieved in the open air.

Natrum mur.—Especially suitable in caries of the spine before suppuration sets in.

Nitric acid.—Especially suitable for lean persons, with dark complexion, black hair and eyes (exactly opposite Calc.). Syphilitic cachexia; mercurial poisonings.

Phosphorus.—Pain as if back were broken; paralytic weakness of the small of back; sick and paralytic feeling of the body. Spinous processes of the vertebræ, between the shoulder-blades, are very sensitive to touch; also the muscles between the spinal column and left-shoulder blade. In tall, lean people who are given to sexual excess; night sweats.

Pulsatilla.—Aching pains, as if weary; lacerating or sticking pains in back; excessive debility; tremulous weakness; gloomy and melancholy; peevishness, interscapular pain, worse by inspiration.

Rhus tox.—Numbness and stiffness of the limbs; gait slow, dragging, difficult; sudden paroxysms of fainting; tightness of breath, and contractive sensation in the chest; worse on beginning to move, better from continued motion. Curvature of dorsal vertebræ.

Silicea.—Lameness of the back, sensation of weakness, paralysis with pressure and tension, especially on touching it; violent, spasmodic pains; inflamed psoas abscess; sinuses from abscess; severe bone pains; heaviness of the lower limbs; faulty nutrition in lymphatico-sanguine temperaments; head sweats; tenderness of the surface; spinal paresis.

Staphisagria.—Stitches, as with knives, between the cervical vertebræ. Weakness of the muscles of the neck, with heaviness of the head, which falls forward while sitting, or has to be leaned against something backwards or sideways; soreness and drawing pressure in the upper vertebræ, also severe stitches in the same, upwards. Suppurating swelling in the psoas muscles.

Sulphur.—Nightly suffocative fits; taciturn, out of humor; irritable; talking excites pain; burning, drawing, and pulsating pains in back; creaking and cracking of the vertebræ, especially on bending the head back, and pressing it on the pillow; in scrofulosis; psora, "dartrous" or "herpetic diathesis."

Hypericum.—Spinal irritation with tenderness from the cervical vertebræ to the sacrum; frightful illusions; frequent attacks of paroxysms of pain.

Physostigma.—Congestive state of paralysis of spinal cord with spasms; stiffness of neck with feeling of drawing and tension; weak back, unable to stand erect; pain with sense of stiffness running down the spine; inclination to bend the head forward (ant.-post. curvature), difficult to sit erect; limbs weary, as if after great fatigue.

Zincum.—Spinal irritation, with pains only while sitting; violent, long-lasting aching pains in lumbar vertebræ, worse sitting, better standing; burning pains along the whole spine.

Secale cor.—Muscular twitching in the back extending to the abdomen; tingling in back, extending to the toes; irregular movements of the whole body; lateral curvation in dorsal and lumbar regions.

Hepar.—Threatened formation of abscess in the spine, and for sinuses extending to the diseased vertebræ, with scanty, thinnish, yellowish discharge, and pain along their tracks.

In the *very early period* of the disease, well-regulated rest in the supine position may be beneficial, but the fact is, that these patients rarely fall into the hands of the surgeon until the period has passed when general rest can be made of essential importance.

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